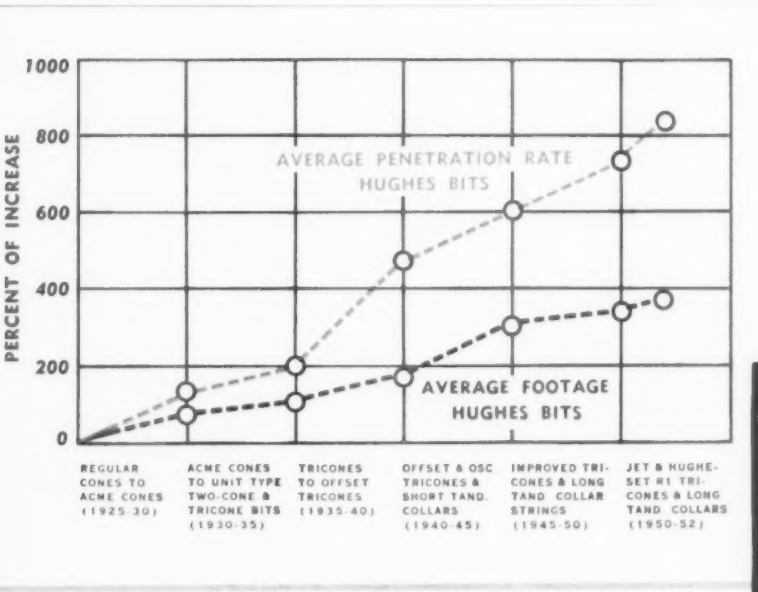
I.P.E. ISSUE NO. 2

the OIL AND GAS JOURNAL



DRILLING INDUSTRY TEAMWORK PRODUCED THIS ACHIEVEMENT

The above chart is more than a record of the performance of Hughes rock bits. The increase in penetration rate of approximately 800% and almost 400% increase in footage drilled per bit, during the past 27 years, reflect the achievement of the industry.

Better bit designs alone could not have accomplished this. It took the know-how and experience of the *drilling contractors* and *drilling departments of the oil companies*, and the co-operation of the entire drilling industry to develop the techniques and equipment that have helped produce this outstanding performance record.

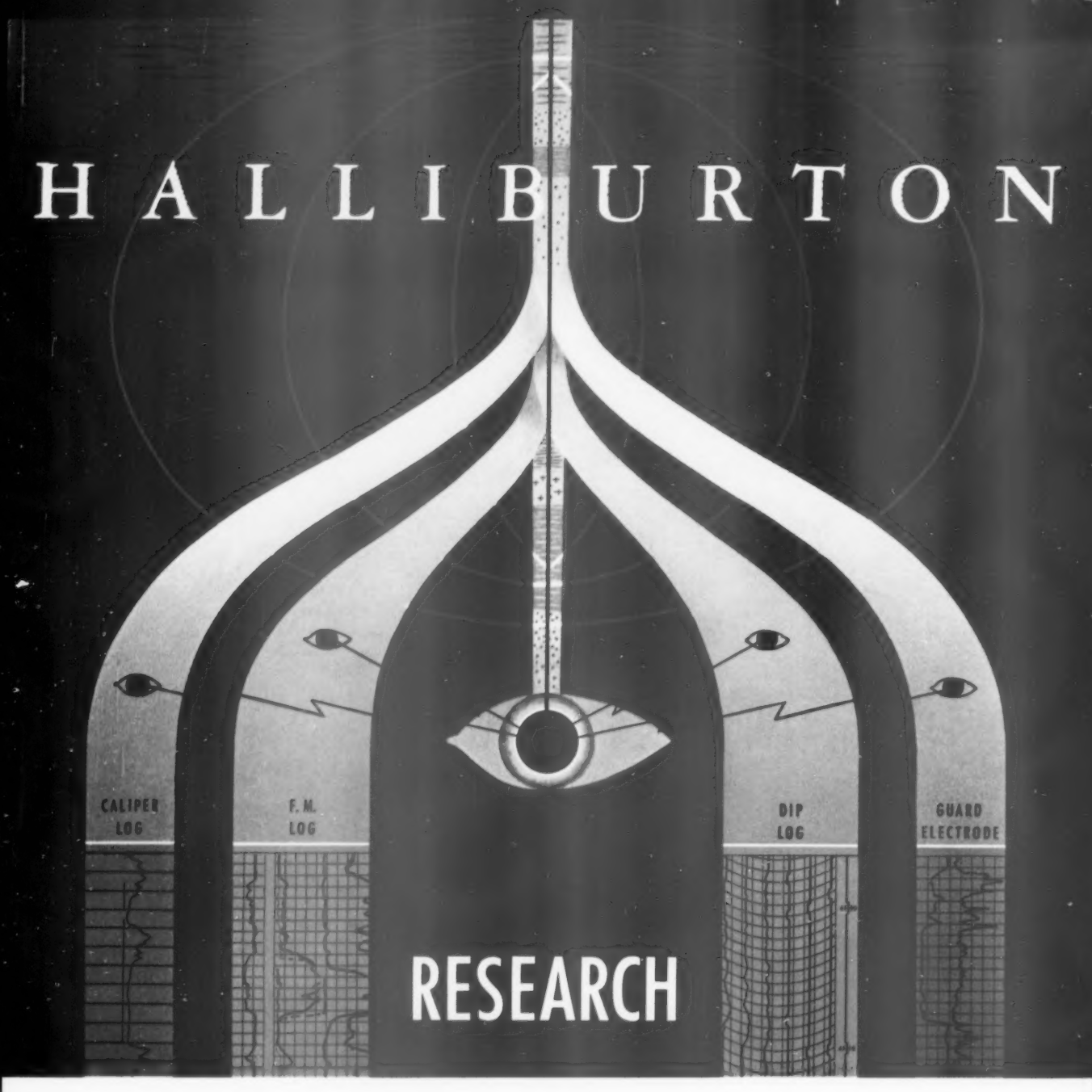
As a result of this combined industry effort, improved bit penetration and footage drilled per bit have partially offset rising drilling costs. We are proud of the important part that HUGHES has played in this achievement.

PRICE 50 CENTS

TABLE OF CONTENTS ON PAGE 1

MAY 25, 1953

HALLIBURTON



The Exploring Electrode of Progress

Someday, with advancing science, finding oil may be a certainty. Even now, exploring formations electrically has given oil finding its greatest lift. The all-seeing eye of the electrode reports down-hole data with much greater detail and accuracy. One of the first to use this force was Halliburton. And to learn that interpreting electric logs was a laborious and painstaking analytical process. Highly specialized interpretive techniques were developed, which in turn demanded improved instruments. This has gone on for years and years, a most important research project in Halliburton's modern laboratories at Houston. It accounts for Halliburton's leadership in electrical well services and the recent developments of Guard Electrode Logging, FM Logging, and Dip Logging. These major contributions to modern exploration and production demonstrate decisively that research is the exploring electrode of progress.

HALLIBURTON OIL WELL CEMENTING CO., DUNCAN, OKLAHOMA

PERPETUAL PROGRESS IN PRODUCTION IMPROVEMENT TECHNIQUES

the OIL AND GAS JOURNAL

MAY 25, 1953 VOL. 52 NO. 3

OIL IN THE NEWS . . .

Successful Oil Exposition Ends; Next One Tentatively Planned 126
Visiting Oil Men See Latest in Equipment in:
Drilling 127
Production 129
Processing 132
Instrumentation 134
Pipe Line 135
Exploration 137
Harry Crawford Honored as Pioneer of Pioneers of Oil Industry 139
Pictures of Representative International Visitors at Oil Show 140
Pictures of Representative Groups of Oil-Company Visitors 142
Refining Members of A.P.I. Face Busy Year 143
Imports of Crude Oil Up 41,000 Bbl. Over February 143
Geophysicists Discuss Problems at Permian Basin Meeting 145
Texas Allowable Raised 56,684 Bbl. Daily for June 145
World Production Shows Slight Decline During March 147
Another Tanker Leaves Japan to Pick Up Iranian Oil 148
Geophysics for the Layman Demonstrated at I.P.E. 285
April Wildcat Completions Ahead of 1952 286
Completions of All Wells Show Gain in April 288

NEWS FEATURES . . .

They Say 113
Calendar of Events 117
Journally Speaking 121
Editorial 123
This Week 125
International News 147
Personals 149
Deaths in the Industry 151
Pipe-Line News 273
Refining News 276
Drilling Contractors 278
Natural-Gas News 283
Natural-Gasoline News 283
Exploration Statistics 308
Production Statistics 309
Refining Statistics 310
Market Statistics 311

TECHNOLOGY AND OPERATION . . .

[1]McKamie Gasoline Plant Processes 50 M.M.c.f. Daily 152
By K. G. Pearce
[2]Ulysses Gasoline Plant Now Stanolind's Largest 156
[3]Sinclair's Big-Inch Crude Line Crosses Five Rivers 160
New Light on Electric-Motor Maintenance 172
By F. H. Walker, Jr. and W. J. O'Meara
Unit Agreements and Methods of Participation 184
By E. B. Miller
[4]Is Your Plant Corroding? 201
By E. W. Wallace
Making a Hot Tap at 850 Psi. 211
Shell's Multipurpose Elk City Field Processing Plant 214
[5]Revamped Cyclone System on Humble's Cat Cracker 220
Gas Injection Projects in West Texas 230
By Pat E. Fletcher
Grace Chemical Will Make Ammonia, Urea 246
On the Job in Fields and Plants 250
Engineering Reference Section 259-269

DEPARTMENTS . . .

Books 183-247
On the Job—Fields 250
On the Job—Plants 257
Engineering Reference 259
Refiner's Notebook 261
Engineering Fundamentals 263
Questions on Technology 265
Progress in Metals 267
Modern Drilling 269
Equipment Men in News 270
Active Rotary Rigs 280
Areal Field Reports 289
Classified Advertising 312
Advertisers' Index 317

In Brief . . .

1. UNUSUAL GASOLINE PLANT . . . The McKamie gasoline plant of McKamie Gas Cleaning Co. has recently been enlarged to fulfill four important functions: (1) gas and liquid sweetening, (2) distillate stabilization, (3) absorption recovery of natural gasoline and L.P.G. fractions, and (4) gas dehydration and injection. An acid-gas stream from the plant is piped to the adjacent Mathieson Chemical Corp. plant for additional processing and sulfur recovery.

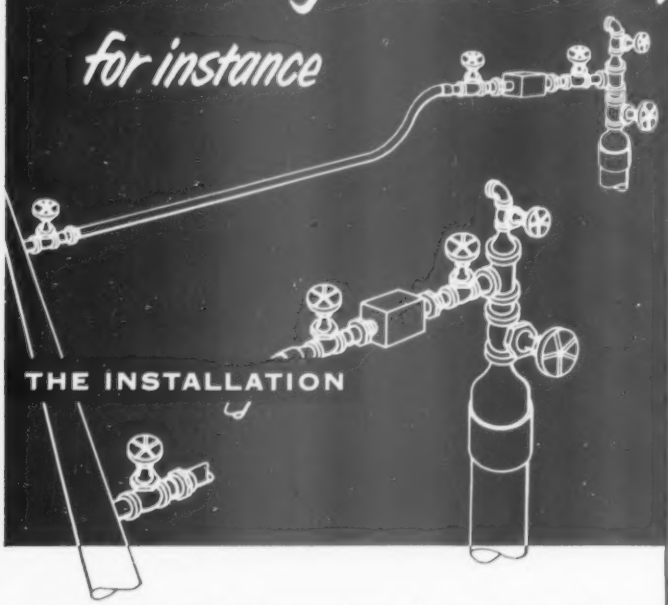
2. LARGEST STANOLIND PLANT . . . The most recent addition to the Stano plant makes it largest in gas-processing capacity of Stanolind's gasoline and cycling plants. Deethanizer of new plant handles the still-top product and recompression condensate from both plants. A portion of deethanizer bottoms product is returned to the old plant for further processing.

3. "RIVER-CROSSINGEST" LINE . . . Sinclair Pipe Line Co.'s new big-inch crude-oil pipe line crosses five major rivers along its route from Cushing, Okla., to East Chicago. The line is built in two segments, one of 24-in. diameter, and one of 22-in. diameter. Capacities with original seven pump stations are 280,000 bbl. daily on 24-in. segment and 150,000 bbl. daily on 22-in. segment.

4. GAS-PLANT CORROSION . . . Corrosion in gas-handling equipment has been observed in almost all instances where appreciable amounts of liquid water can be removed from the system. The severity of corrosion at these points is determined to a large extent by the amount of acid gases or the amount of air which is available. Proper correction of these conditions can appreciably alleviate this corrosion.

5. CAT-CRACKER REVAMP . . . Alterations and modifications to cat cracker No. 1 at Humble's Baytown refinery have made possible an increase in capacity from 13,380 to 55,000 bbl. of charge per stream day. More recent changes have involved complete revamp of cyclone system in spent-catalyst and regenerated-catalyst vessels, and fabrication of new housings for both of these vessels. Other changes include installation of new furnace and large centrifugal gas compressor, rearrangement of heat exchangers and enlargement, and modification of flow and air lines.

Valve Performance that Speaks for itself ...on Well Injection Service, for instance



In the Kansas field operations of a prominent oil company, with Crane Bronze Gate Valves on injection lines to wells for oil production by water flooding. Working pressure approximately 900 psi.

VALVE SERVICE RATINGS

SUITABILITY:	Best by test
FEATURES:	Hard, tough, nickel alloy disc
MAINTENANCE COST:	Routine care only
SERVICE LIFE:	Now in line more than 4 years
OPERATING RESULTS:	Proper control of system
AVAILABILITY:	Crane catalog item—No. 624E

THE CASE HISTORY

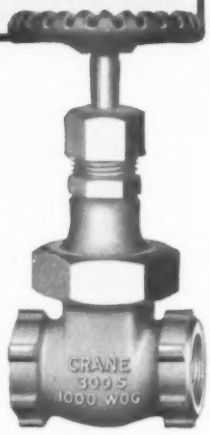
Originally, this well-flooding system was installed with plug valves which proved a severe handicap. Corroded by the salt water, the valves stuck so hard they couldn't be operated to cut in or shut off wells on the line.

Iron body valves also were tried, but gave no better results. They corroded and leaked, losing much needed pressure.

More than 4 years ago, Crane No. 624E Bronze Gate Valves were put on the system. Corrosion and leakage were eliminated. Valve operation became smooth, easy, positive—the way it should be. And, ever since, that's how these Crane valves have performed. No wonder this producer, like many others, has hundreds of them in similar service.

THE VALVE

Crane No. 624E gate valves have unusually heavy metal sections and are ruggedly constructed throughout for high pressure service. Body and bonnet are of Crane Special Bronze, a high-grade leaded tin bronze. Disc is of hard, tough Crane Nickel Alloy. Better Crane quality in every detail makes them last and last. Sizes up to 2 in. rated at 1,000 psi. W.O.G. See your Crane Catalog or ask your Crane Representative for demonstration.



THE BETTER QUALITY...BIGGER VALUE LINE...IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois

Branches and Wholesalers Serving All Industrial Areas

VALVES · FITTINGS · PIPE · PLUMBING · HEATING

Air Casualties

It's bad air that does it. But you can step up production by putting a Coppus Blower on the job to keep the air moving — and keep the men cool.

The kind of air a man works in has a lot to do with how much work he can turn out.

In confined places like shipholds or tanks or drums or boilers . . . or wherever the air is stagnant or hot or full of fumes . . . a Coppus Blower is a *must* for getting first-class work out of the men, all the time.

A Coppus Blower or Exhauster helps avoid sickness and lassitude due to bad air . . . and improves morale, too.

Portable and adaptable for special purposes, Coppus Blowers and Exhausters will have dozens of uses around your plant. The "Blue Ribbon" (a blue painted band) is your assurance of quality performance at lowest cost.

COPPUS

BLUE RIBBON BLOWERS

THE BLOWERS THAT PUT MORE MINUTES IN EVERY MAN-HOUR

CABLE MANHOLE AND TANK VENTILATORS — BOILER MANHOLE BLOWERS AND EXHAUSTERS — HEAT KILLERS — SHIPHOLD VENTILATORS . . . DESIGNED FOR YOUR INDUSTRY — ENGINEERED FOR YOU

MAIL THIS COUPON To Coppus Engineering Corp., 266 Park Avenue, Worcester 2, Mass. Sales offices in THOMAS' REGISTER. Other "Blue Ribbon" Products in BEST'S SAFETY DIRECTORY.

PLEASE SEND ME INFORMATION ON SUPPLYING FRESH AIR TO MEN WORKING:

- ☐ in tanks, tank cars, drums, etc.
- ☐ in underground cable manholes.
- ☐ in aeroplane fusilages, wings, etc.
- ☐ on coke ovens.
- ☐ on steam-heated rubber processes.
- ☐ on boiler repair jobs.

COOLING:

- ☐ motors, generators, switchboards.
- ☐ wires and sheets.
- ☐ general man cooling.
- ☐ around cracking stills.
- ☐ exhausting welding fumes.
- ☐ stirring up stagnant air wherever men are working or material is drying.
- ☐ drying of walls, sheets, etc., after treated with coating material.

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(Write here any special ventilating problem you may have.)

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This first "Oilwell" waterflood pump was installed in 1943 and still gives good service.

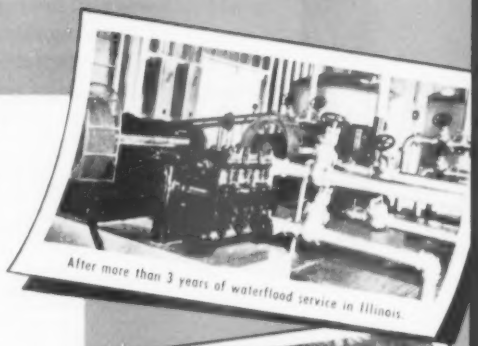
An early Kansas waterflood near El Dorado.

An early Texas "flood" near Corsicana.

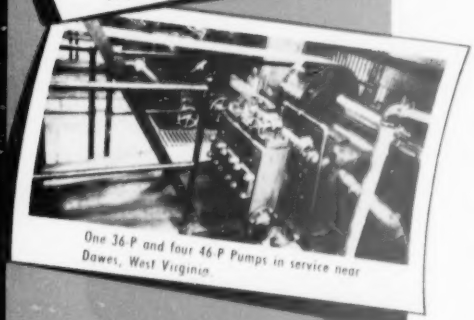
Over 375 "Oilwell" Triplex 6" Pumps

...are now in service on Waterflood Projects EVERYWHERE

20 pumps in one waterflood installation near Bradford.

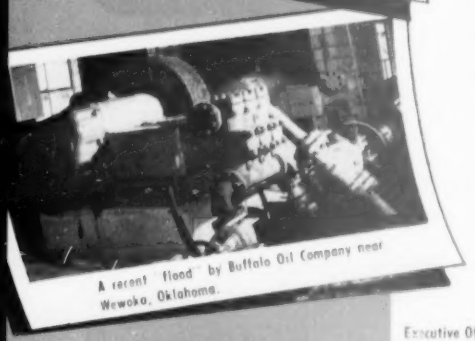


After more than 3 years of waterflood service in Illinois.



One 36-P and four 46-P Pumps in service near Dawes, West Virginia.

A recent "flood" near Lake Charles, Louisiana.



A recent "flood" by Buffalo Oil Company near Wewoka, Oklahoma.

Two No. 36-P Pumps operate at 1500 p.s.i. at Dominguez field near Long Beach, California.

COLORED portions of this little map show the extent to which waterflood operations have expanded since the Bradford "boom days" of 1935.

To meet the needs of continuous operations at high-pressure, so essential in waterflooding, "Oilwell" introduced the first pumps designed specifically for this type of service.

Today you'll find "Oilwell" No. 36-P and No. 46-P Triplex Plunger Pumps are "*first choice*" of operators in most waterflooding areas because of their outstanding records for continuous, economical performance.

Specify "Oilwell" Pumps . . . for YOUR waterflood. Service engineers and maintenance parts are always available through your nearest "Oilwell" Store.

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Branches Serving All Oil Fields

USS TRADE MARK

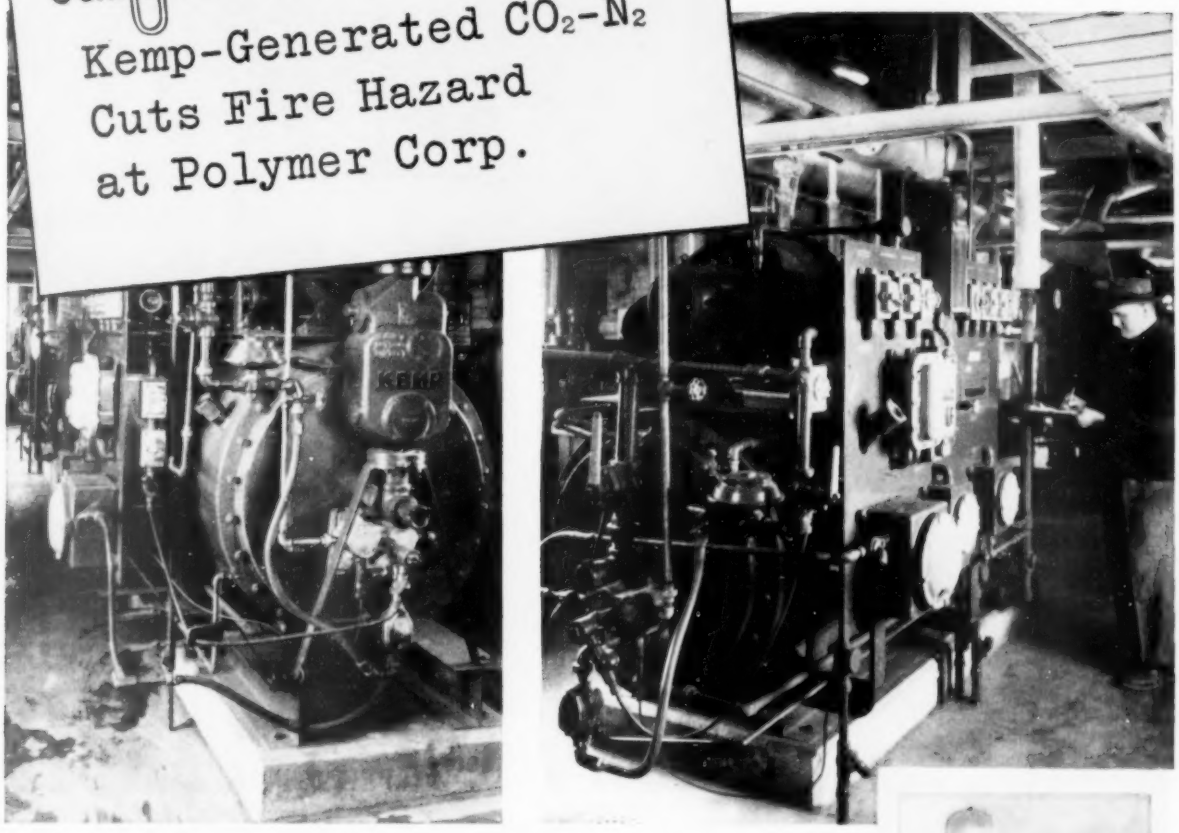
"OILWELL"

TRADE MARK

UNITED STATES STEEL

Case No. 62

Kemp-Generated CO_2-N_2 Cuts Fire Hazard at Polymer Corp.



How Polymer operated day and night for 10 years at maximum safety

When Polymer Corporation, Ltd., Sarnia, Ontario, began operations in 1943, inventory included two Kemp MIHE Inert Gas Generators. Since that date, Polymer—and its Kemp equipment—has been operating 24 hours a day, 365 days a year. The huge quantities of man-made rubber and associated chemicals it produces—200,000,000 pounds during one year alone—reach, in one form or another, the four corners of the world.

Kemp Plays an Important Role

The high volatility of many of the ingredients used in this giant operation necessitates blanketing and purging vessels after use. It is in this step that Polymer employs Kemp Generators to assure safe, trouble-free performance. The gas they produce is piped to different operations over the entire company area—it *must* be clean! Kemp does the job—Polymer knows that it can depend on Kemp to deliver a *clean inert at a specific analysis, regardless of demand*. And every Kemp Generator is engineered for fast starts and easy operations that save *time* and *money*.

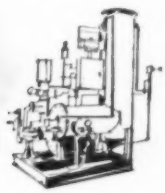
Kemp Can Do a Job for You

Kemp superiority is no accident. It is based on years of experience . . . on quality of design to meet specific problems. Every Kemp design features the Kemp Industrial Carburetor for complete combustion without tinkering or waste . . . for simplified installation and maintenance. Every Kemp design includes the latest fire checks and safety devices. If you have a blanketing or purging problem, contact Kemp engineers. They will be glad to study your situation and recommend the installation best suited to your needs. No obligation, of course.

Gas generator building from which inert gas is piped over 130 acres of company property at Polymer's Sarnia, Ontario, operation.

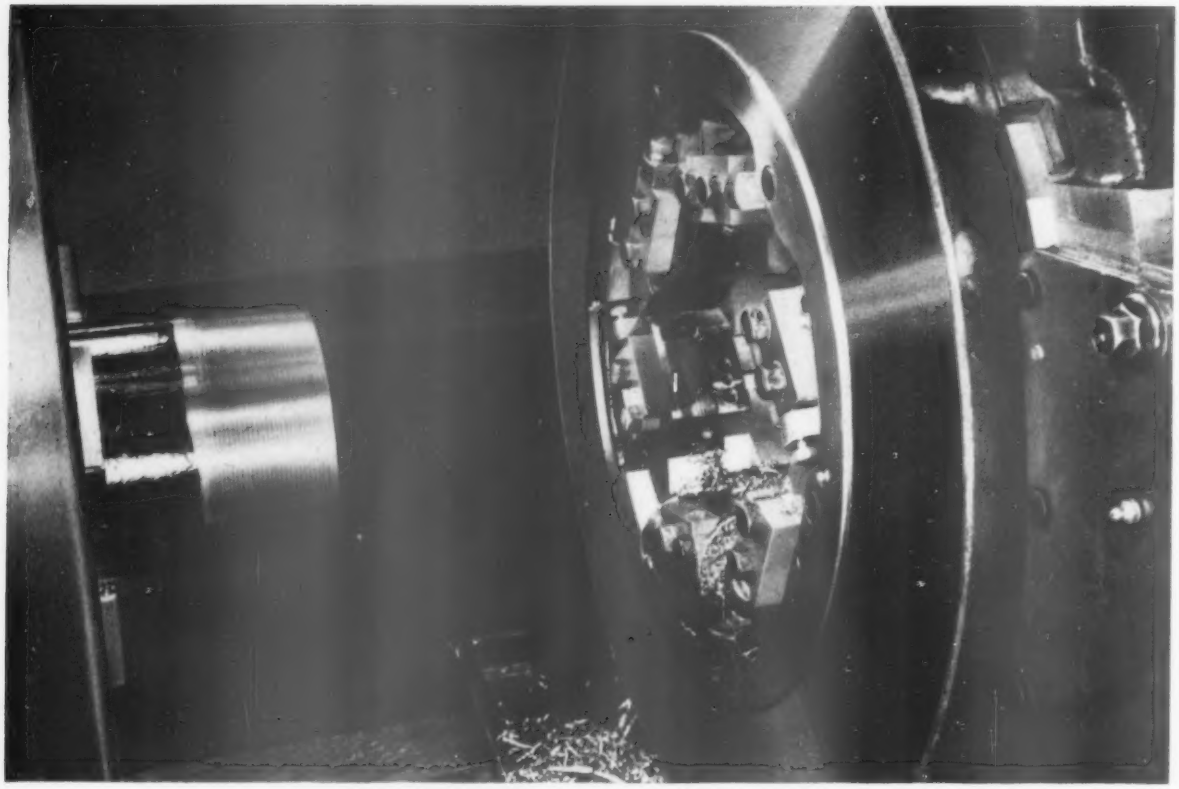
For more complete facts and technical information, write for Bulletin I-10 to: **THE C. M. KEMP MFG. CO., 405 East Oliver Street, Baltimore 2, Md.**

KEMP OF BALTIMORE



INERT GAS GENERATORS

CARBURETORS • BURNERS • FIRE CHECKS
METAL MELTING UNITS • ADSORPTIVE DRYERS
SINGEING EQUIPMENT



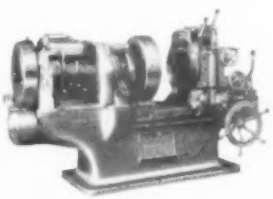
LARGE TEXAS SHOP USES LANDIS PIPE MACHINES *Exclusively . . . .*

TEN LANDIS Receding Chaser Pipe Threading Machines are used by Atlas Pipe, Inc., largest mill-type pipe finishers on the Gulf Coast, for threading oil tubular goods.

These machines are installed in an offset position so as to permit uninterrupted production. Typical production figures show: the 4¾" machines threading 74 joints (148 threads) per hour from 2⅜" upset tubing—the 8⅝" machines averaging 20 joints (40 threads) per hour from 5½" casing. All threads are 8 pitch to API standards.

Mr. Becker, Plant Manager, highlights the important production advantages of LANDIS Pipe Machines when he says that they were selected for their flexibility, versatility, and the uniform threads produced. Thread uniformity is made possible by massive construction, leadscrew control of the carriage movement, a precision-built die head featuring LANDIS Tangential Chasers, and an attachment which mechanically controls the degree of taper.

These machines offer flexibility through wide range coverage—three sizes of machines (4¾", 8⅝", 13⅝") thread all pipe sizes from 1⅝" to 13⅜". Ease of set-up is also important — a change of diameter and length in less than two minutes, a complete change for diameter, pitch, taper, and length in 40 minutes.



LANDIS Receding Pipe Machines perform four other pipe fabricating operations in addition to threading: cutting off, chamfering, reaming, and the making and breaking of collars. For more information, write for Bulletin C-77.

SEE THESE MACHINES AT THE TULSA OIL SHOW, MAY 14-23, BOOTHS 17 & 18, CALIFORNIA BUILDING

THE LANDIS *Machine* CO. 50th ANNIVERSARY WAYNESBORO PENNSYLVANIA

Represented in the Domestic Oil Fields by: Colcord-Wright Machinery & Supply Co., St. Louis, Mo.; C. J. Harter Machinery, Houston, Texas; Frederic Baker Co., New Orleans, La.; Moore Machinery Co., Los Angeles and San Francisco, Calif.; Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo.

The steel pipe above is almost completely clogged with paraffin; the clean Tenite test section at the right has been in service for months on a high-paraffin oil line. Paraffin accumulated only on the steel pipe connector.

Paraffin did not clog this pipe!

Paraffin does not adhere to Tenite plastic. Frequent shutdowns for cleaning out paraffin in pipe lines are minimized since the extra-smooth walls of Tenite plastic pipe resist paraffin accumulation. What's more, this smoothness gives you approximately 40% greater flow volume for any given head loss than does clean steel pipe of the same diameter.

Tenite pipe is economical to install, too. Its light weight and ease of handling may save you over 60% labor costs in the installation alone. In a typical case, three men easily laid 4000 feet of 4" Tenite pipe a day; usually, eight men are required to handle the same amount of steel pipe.

Extruded of Eastman cellulose acetate butyrate plastic, Tenite pipe does not corrode under oil-field conditions. It successfully withstands sour crudes, salt water and electrolytic action.

Pipe extruded of Tenite is made by various companies, to which Eastman supplies the plastic compound. If you need assistance in adapting Tenite pipe to your operation, our technical staff will be glad to help. Eastman Chemical Products, Inc., Kingsport, Tenn., sales representative for Tennessee Eastman Company, Division of Eastman Kodak Company.

TENITE

an Eastman Plastic

visit our exhibit

at the

INTERNATIONAL PETROLEUM EXPOSITION

May 14-23

and see the advantages of

TENITE *plastic pipe demonstrated*

Block 208, North Extension

SAFETY...first and fast

This team of Caterpillar D8 Tractors with MD8 Pipe Layers is lowering in 26-inch gas line near Greenville, Miss. On another stretch near here these husky machines, which are owned by H. C. Price Co. of Bartlesville, Okla., crossed three-quarters of a mile of flooded rice field in only two hours. That was real speed, but it was made with full regard for the safety of the pipe-laying crew.

Accuracy of control is vital in this work. The Cat* MD8 Pipe Layer has separate brakes and clutches on both boom and load line drums. Conveniently placed operating controls and a special, heavy-duty Caterpillar transmission mean precise placement of the pipe—and "built-in" safety for the men on the job.

The Cat D8 Tractor and MD8 Pipe Layer are a mighty combination. They have the balanced weight and power, the surefootedness in sticky going, the *muscles* to stay on the job with a minimum of maintenance. The long-wearing Diesel engine in the D8 develops an honest 148 HP, on low-cost No. 2 furnace oil.

Many spreads have standardized on Caterpillar equipment. They find, no matter where their jobs take them, that they can count on fast service from skilled Caterpillar Dealers.

Ask your nearby dealer for an on-the-job demonstration of Caterpillar track-type Tractors and Pipe Layers that fit *your* requirements.

Caterpillar Tractor Co., Peoria, Illinois.

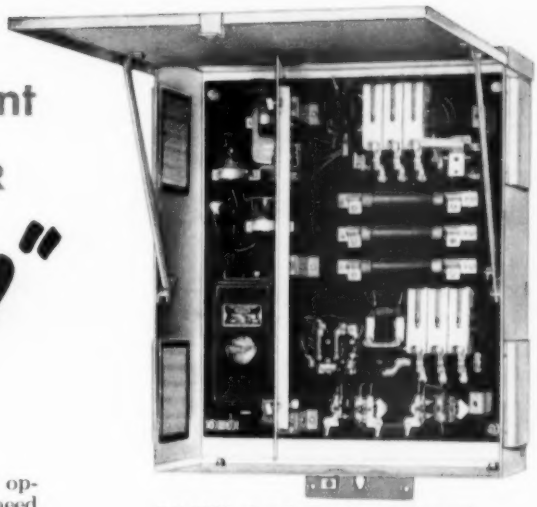
CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

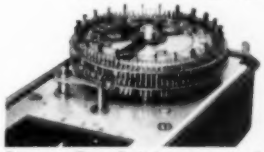
**NAME THE DATE...
YOUR DEALER
WILL DEMONSTRATE**

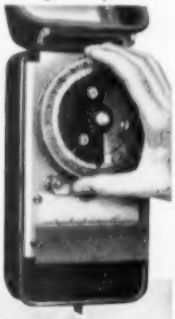
Visit the Caterpillar exhibit at the International Petroleum Exposition.

We give you what you want in genuine CUTLER-HAMMER "Oil Country" well pumping control



C-H 9589 oil well pumping controller with 3 coil overload and undervoltage relay.





Program Time Switch automatically schedules pumping, set up easily by pull tabs—one for each 15 minute interval. Day omission feature also available, for non-operation any selected days of week.

Cutler-Hammer went to the oil country to find out what oil operators, practical production men, maintenance crews really need and want in their oil well pumping control.

And Cutler-Hammer Oil Country Control *proves out*. The practical way in which heat is shielded out and fresh clean air pours in around the working mechanism proves out. You never see C-H control with the door propped open to keep it working.

The extraordinary care to keep out dirt, large particles of dust and bugs proves out. Louvres, bronze-screening and baffle plates do their work. And the famous C-H Vertical dust safe contacts shed dirt and dust to keep clean, sure contacts. Timer is neoprene-gasketed and dust proof. And the excess torque time clock keeps going if inadvertently dust gets in.

Undervoltage relay if you want manual restarting. Automatic time delay if you want automatic staggered starting of groups of motors.

Full three phase protection with 3 coil overload relays if you want to avoid motor burnouts which can result from single phasing.

Pumping sequence changes are made in 15 minute increments. You just pull small, accessible tabs. Day omission feature is also available on the time programming switch when your scheduling calls for skip-a-day pumping.

Unit type lightning arresters that tell at a glance if they've blown and eliminate the need to clean up or rebuild the starters.

There are so many wanted features on these controllers, there is not room enough to tell them all. Ask for further information. Or better still, try out a C-H starter and compare it with the performance of any other make you have ever had. CUTLER-HAMMER, Inc., 1453 St. Paul Avenue, Milwaukee 1, Wisconsin. *Associate:* Canadian Cutler-Hammer, Ltd., Toronto.

CUTLER-HAMMER
MOTOR CONTROL
C-H

MEMBER AMERICAN PETROLEUM INSTITUTE

PENBERTHY Liquid Level Gages

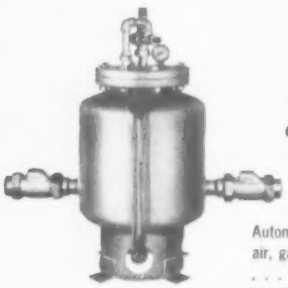
YOU CAN *Remove and Replace Without Shutdown*

Union connections between the gage and the valves permit removal of gage for repairs without shutting down the equipment. Just close the valves, uncouple the unions and remove the gage. The convenience of this is obvious. When glasses have to be replaced or repairs made, it is not necessary to work in an awkward position or to shut down. Another advantage: a gage needing repairs can be replaced immediately by a spare and the repairs made at leisure. There are many other reasons for the superiority of Penberthy Liquid Level Gages; ask for Catalog 35.

OTHER PENBERTHY PRODUCTS

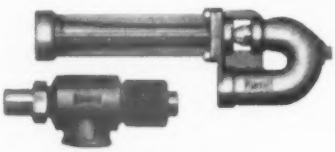
PENBERTHY TRANSPARENT GAGE

Used to observe color and density of liquids under high pressures and or temperatures. Exceptionally sturdy construction —liquid chamber machined from solid block of metal. Ask for Catalog 35.



PENBERTHY CYCLING JET PUMPS

Automatically operated by air, gas or steam pressure . . . Will pump without clogging any liquid that will flow through pipes. Ask for Bulletin 5030.



PENBERTHY EJECTORS

A simple jet pump operated by air, water or steam. Needs no lubrication . . . will not get out of order. Made in wide variety of materials and special units developed to meet unusual conditions. Ask for Bulletin 512.

PENBERTHY EXPLOSION-PROOF SUMP PUMPS

Motor and switch totally enclosed. Underwriter approved for Class I, Group D, and Class 2, Groups E, F and G hazardous location. Made of copper and bronze throughout. Ask for Bulletin 4929.

4672

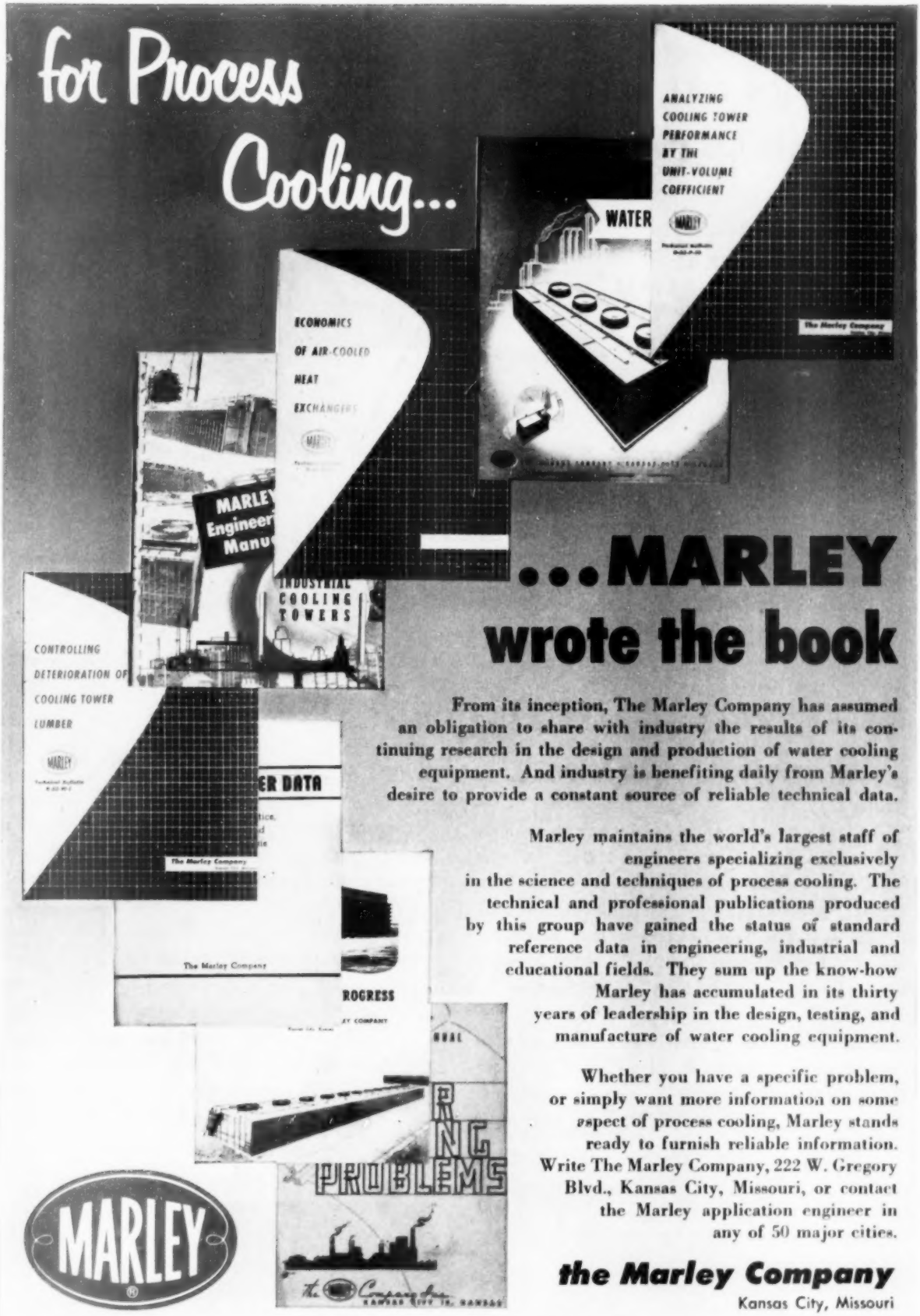
PENBERTHY INJECTOR COMPANY

DIVISION OF THE BUFFALO-ECLIPSE CORPORATION

DETROIT 2, MICHIGAN

Established 1886 — *Canadian Plant, Windsor, Ontario*

for Process Cooling...



...MARLEY wrote the book

From its inception, The Marley Company has assumed an obligation to share with industry the results of its continuing research in the design and production of water cooling equipment. And industry is benefiting daily from Marley's desire to provide a constant source of reliable technical data.

Marley maintains the world's largest staff of engineers specializing exclusively in the science and techniques of process cooling. The technical and professional publications produced by this group have gained the status of standard reference data in engineering, industrial and educational fields. They sum up the know-how Marley has accumulated in its thirty years of leadership in the design, testing, and manufacture of water cooling equipment.

Whether you have a specific problem, or simply want more information on some aspect of process cooling, Marley stands ready to furnish reliable information. Write The Marley Company, 222 W. Gregory Blvd., Kansas City, Missouri, or contact the Marley application engineer in any of 50 major cities.

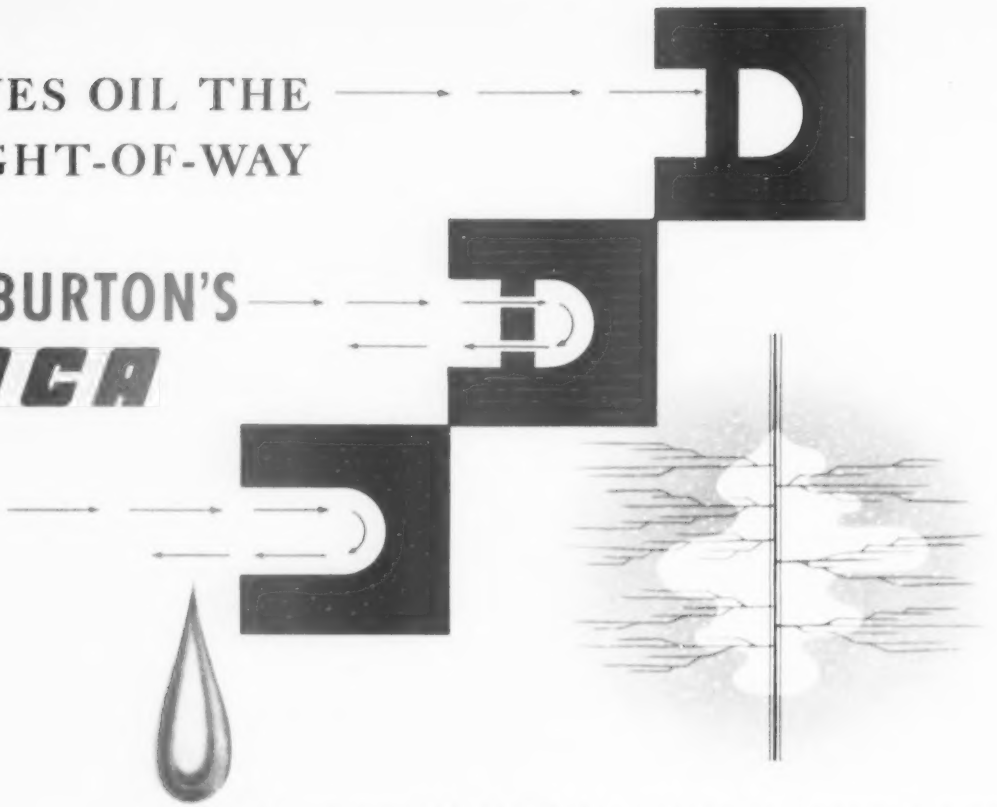
MARLEY®

the Marley Company

Kansas City, Missouri

GIVES OIL THE RIGHT-OF-WAY

HALLIBURTON'S MCA



SHRINKS and FLUSHES BENTONITE FOR MORE EFFECTIVE FLOW!

The problem of obtaining oil from bentonitic formations is no longer a nemesis for petroleum operators, thanks to Halliburton's Mud Cleanout Agent.

This effective chemical compound, a unique blend of hydrochloric acid and Halliburton's Morflo, was designed to increase productivity in all types of formations by removing mud lost during drilling and completion operations. But MCA has achieved a signal success in boosting effective flow *in silicious and bentonitic formations.*

Hydrochloric acid present in MCA performs its recognized task of dissolving calcareous content present in all muds. In addition, it causes the bentonite to shrink in volume when hydrogen from the HCL replaces sodium on the bentonite. Morflo disperses the filter cake so the shrunken bentonite particles can be washed away and flushed from the formation.

It is now a matter of record that bentonite formations yield greater productive flow when treated with Halliburton's MCA—and that bentonite present does not rehydrate even though sands are reflooded with fresh water.

An increasing number of operators are using this valuable double action agent to free plugged-up pay zones, and many are utilizing MCA prior to squeeze cement jobs to obtain better bonding.

Your nearby Halliburton representative has the facts on how MCA can serve you. Phone him for swift service. Or contact Halliburton Oil Well Cementing Company, Duncan, Okla.

HALLIBURTON

YEARS AHEAD IN PRODUCTION IMPROVEMENT TECHNIQUES!

CABOT ADJUSTABLE CRANK SERIES

Solidly Engineered—

Simply Operated

The Crank Adjustment on the new Cabot Units is a simple, "One, two, three" operation.

(1) With the crank in an approximately horizontal position, loosen the two lock bolts in each of the weights.

(2) Move the weights to the desired position by turning the adjuster bolt.

(3) Tighten the lock bolts and the job is complete.

Now a simplified adjustable crank available on units ranging from 11,000 to 32,000 pounds maximum polish rod load. The Cabot Adjustable-Crank is easily adjusted by one man standing on the ground and with no complicated tools. The simple design eliminates all unnecessary parts, cutting maintenance to a minimum and avoiding expensive replacements. The new crank also provides for one-piece auxiliary weights which can be added by simply lifting them into place and securing with three bolts . . . no dismantling or special attachments are required. In addition to the new simplified adjustable crank the Cabot A-C Series incorporates the Cabot EQUALASTIC® BEARING and many other outstanding features. Write or call your nearby Jones and Laughlin store or representative or write directly to Cabot Shops, Inc. for complete details on the amazing new Cabot Adjustable-Crank Pumping Units.

CABOT

CABOT SHOPS, INC. PAMPA, TEXAS

North American

Gravity Meters for STANDARD EXPLORATION, GEODETIC AND MARINE WORK

•

Manufacturers of Geophysical Equipment and Precision Apparatus

NORTH AMERICAN GEOPHYSICAL COMPANY

2627 Westheimer Rd., KEystone 7408
Houston 6, Texas

57% INCREASED RECOVERY

brought this operator $161.06 more per day

BS&B Glycol Injection System OF LOW TEMPERATURE SEPARATION with Stabilizer*

All is fast payout equipment

Designed to increase and Hold Recovery from Gas Condensate Wells

Here's an operator (name on request) who's making $161.06 more per day because he was not satisfied with old-style separation equipment.

Records for a 2-month test period proved how much more he could make with low temperature separation, using the BS&B Glycol Injection System with Stabilizer. On the first test, operating old-style first stage separator at 800 p.s.i. and at 70° F., recovery was 19.75 barrels per MMSCFD of sales gas. Then the BS&B Glycol Injection System with Stabilizer was put into operation. Separator pressure was 940 p.s.i.—temperature 10° F, on the second test. Stock tank recovery went to 31.03 barrels per MMSCF of sales gas . . . an increased recovery of 57% . . . or an increased daily revenue of $161.06 to this particular operator.

This most modern low temperature separation recovery equipment is compact as well as efficient . . . usually no more than two truckloads. Because the price is right and recovery so high, this is fast payout equipment. The BS&B Glycol Injection System with Stabilizer is practical to operate, practical to own; and salvage value is high. It starts right off giving higher recovery than is possible from any other low temperature separation system . . . even when wells are new or have an available pressure drop of 1000 p.s.i. Glycol Injection Systems are effective with available pressure drops as low as 400 p.s.i.

Have you considered its possibilities on your lease? Shouldn't we talk it over?

* Patented and Patents Pending

EFFICIENCY BS&B RELIABILITY

OUR 50TH YEAR

BLACK, SIVALLS & BRYSON, INC.

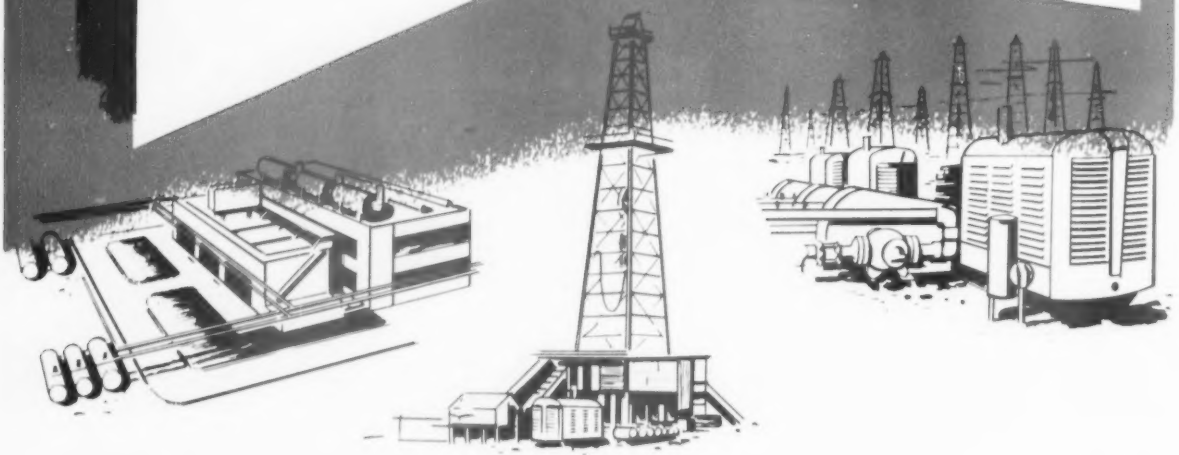
Oil & Gas Equipment Division, Dept. 1-A5B

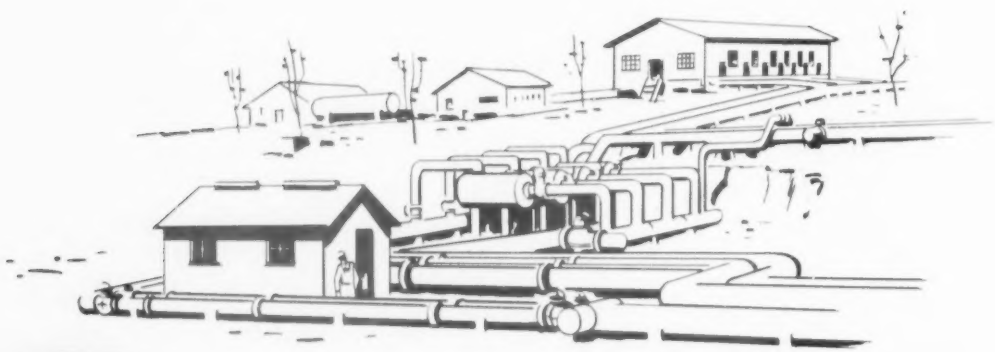
2131 Westwood Blvd. Oklahoma City, Oklahoma

Marquette

HYDRAULIC GOVERNORS

Constantly gaining prominence throughout the industry for dependable speed regulation of Diesel and gas engines





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The Marquette METAL PRODUCTS CO.

CLEVELAND 10, OHIO

SUBSIDIARY OF CURTISS-WRIGHT CORPORATION

Also Manufacturers of:

ROLLER BEARING TEXTILE SPINDLES
WINDSHIELD WIPERS FOR AIRCRAFT
FUEL OIL PUMPS AND INJECTORS
PRECISION PARTS AND ASSEMBLIES
ROTARY HIGH PRESSURE OIL FIELD PUMPING MACHINERY

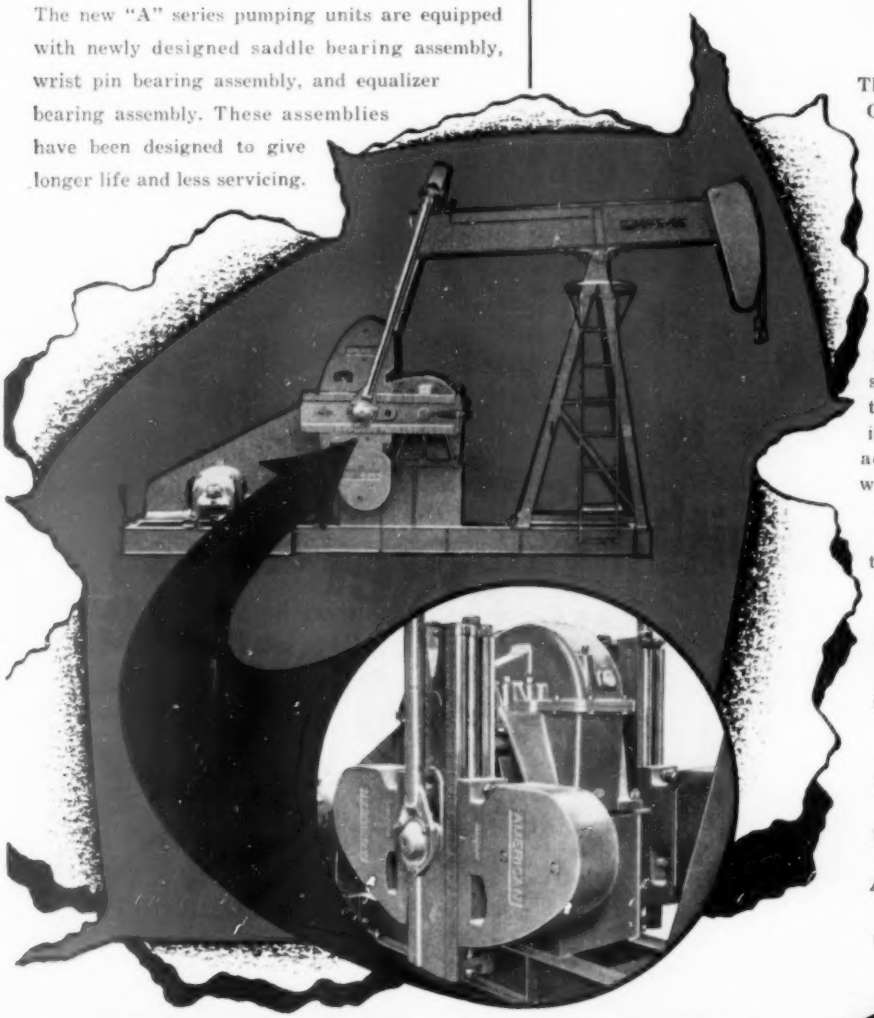
Extra ★★★ **OIL SHOW NEWS** Extra ★★★

Oil Field Equipment Since 1924

AMERICAN Announces New Pumping Units

New Designs Mean Less Servicing

The new "A" series pumping units are equipped with newly designed saddle bearing assembly, wrist pin bearing assembly, and equalizer bearing assembly. These assemblies have been designed to give longer life and less servicing.



New "A" Series Features Adjustable Counterbalance Crank - - -

The American Manufacturing Company of Texas announces its new "A" series pumping units. These new pumping units combine the famous American quality with the new adjustable counterbalance crank.

Easily Adjustable

One man can easily adjust the unit counterbalance by simply loosening two bolts that hold each master weight in position and turning the acme screw that moves the weight to the desired position on the crank. These cranks are also available without the acme screw; the weights can then be moved with a pry bar.

Exact Counterbalance

With the calibrated crank it is possible to adjust the counterbalance to the exact predetermined amount. Pocket type weights can be added to the back side of the master weights to give maximum counterbalance.

American units with leaf weight type cranks are still available.

AMERICAN MFG. CO. OF TEXAS

FORT WORTH 11, TEXAS

HOUSTON • KILGORE • ODESSA • TULSA

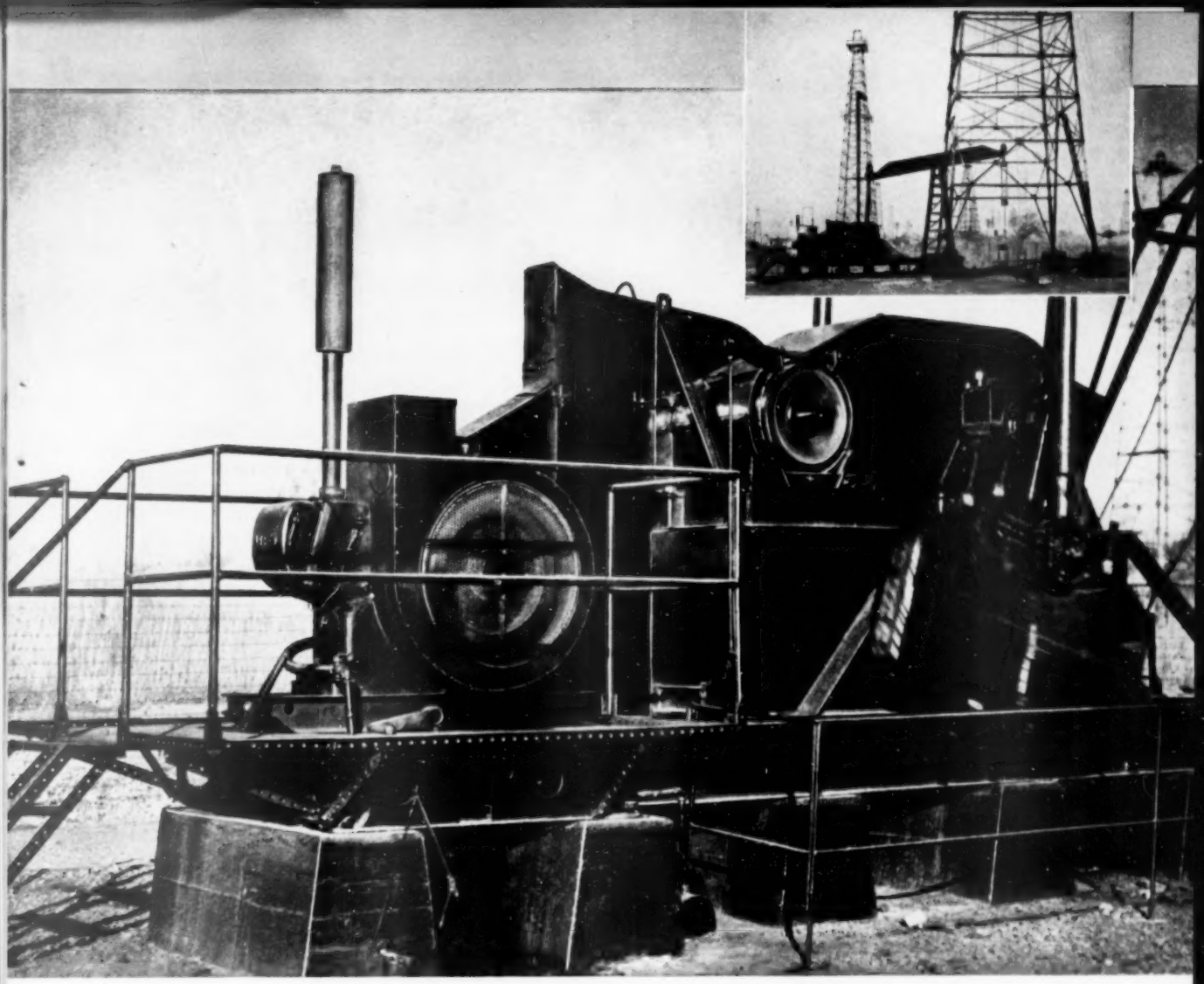
LeRoi A288's do it again!...

...prove that they pump oil

— longer
— at less cost
— with less maintenance

than any other well-pumping engines!

See for yourself



Cost per HP-hour only half

of what major oil company considers good for engines on well-pumping service

Installation No. 1

Le Roi A288 pumped 50 barrels water, 70 barrels oil from 6,475 feet with an estimated load of 11-12 HP.

A288 operated for 1078 24-hour days — without being overhauled!

Operating cost per day — including pumpers' wages, fuel, and maintenance — only 90 cents!

Installation No. 2

Le Roi A288 pumped 180 barrels water, 10 barrels oil from about 6,475 feet with a load of 18 HP.

A288 operated for 911 24-hour days. Maintenance cost was only $.0017/HP-hr.

Operating cost per day — including pumpers' wages, fuel, and maintenance — only 69 cents!

That's real dependability! And economy! It's the kind of profitable performance Le Roi A288 owners in every producing area get every day.

And it's performance *you*, too, can have. See your supply house or Le Roi distributor — ask them to show you A288 installations. And have them tell you the reasons why the A288 is the only engine to be recommended by one major pumping-engine user for continuous service unattended for up to two weeks at a time!

LE ROI COMPANY

MILWAUKEE 14, WISCONSIN

Plants: Milwaukee • Cleveland • Greenwich, Ohio

Oil Field Headquarters: Tulsa Oklahoma

Service as Near as Your Telephone

Complete parts stocks
Skilled mechanics on 24-hour call
Unexcelled overhaul facilities

Oilfield Sales-Service Network

Oklahoma
Le Roi Company Branch — Tulsa
Carson Machine & Supply Co.—Oklahoma City

East & South Texas, Gulf Coast
Southern Engine and Pump Company—Houston, Kilgore, Edinburg, Dallas, San Antonio, Corpus Christi, Texas, and Lafayette, Houma, Louisiana.

North & West Texas, New Mexico
General Machine & Supply Co. — Odessa, Snyder, Texas.
Nortex Engine & Equipment Co. — Wichita Falls, Texas.

Kansas
Carson Machine and Supply Co. — Great Bend

Illinois — Western Kentucky
Western Machinery & Engine Company — Centralia, Illinois and St. Louis, Missouri.

Michigan
Hofer Engine Service — Reed City

Rocky Mountain Area
Gehring Equipment Co — Casper, Wyoming, Rangeley, Col.

Northern Louisiana & Mississippi
Ingersoll Corporation — Shreveport, Louisiana, and Jackson, Mississippi.

West Coast
Le Roi-Rix Machinery Co. — Los Angeles, Long Beach and Bakersfield, Calif.

Appalachian Area
P. C. McKenzie Co., Pittsburgh, Bradford.

Canada
Lucey Export Ltd.—Calgary, Edmonton, Alberta.

P-120

STEERING IS EASY - WITH GALION'S HYDRAULIC BOOSTER

The going may be extra-rough – and the operator may have only ONE arm – but no more effort than the fingertip pressure of one hand is needed to operate the steering control on a GALION Grader!

EASY STEERING MEANS BETTER WORK

With the hydraulic booster doing the "muscle" part of steering, the operator of a GALION Grader can concentrate all attention on doing a better job of blading.

LARGE FRONT TIRES

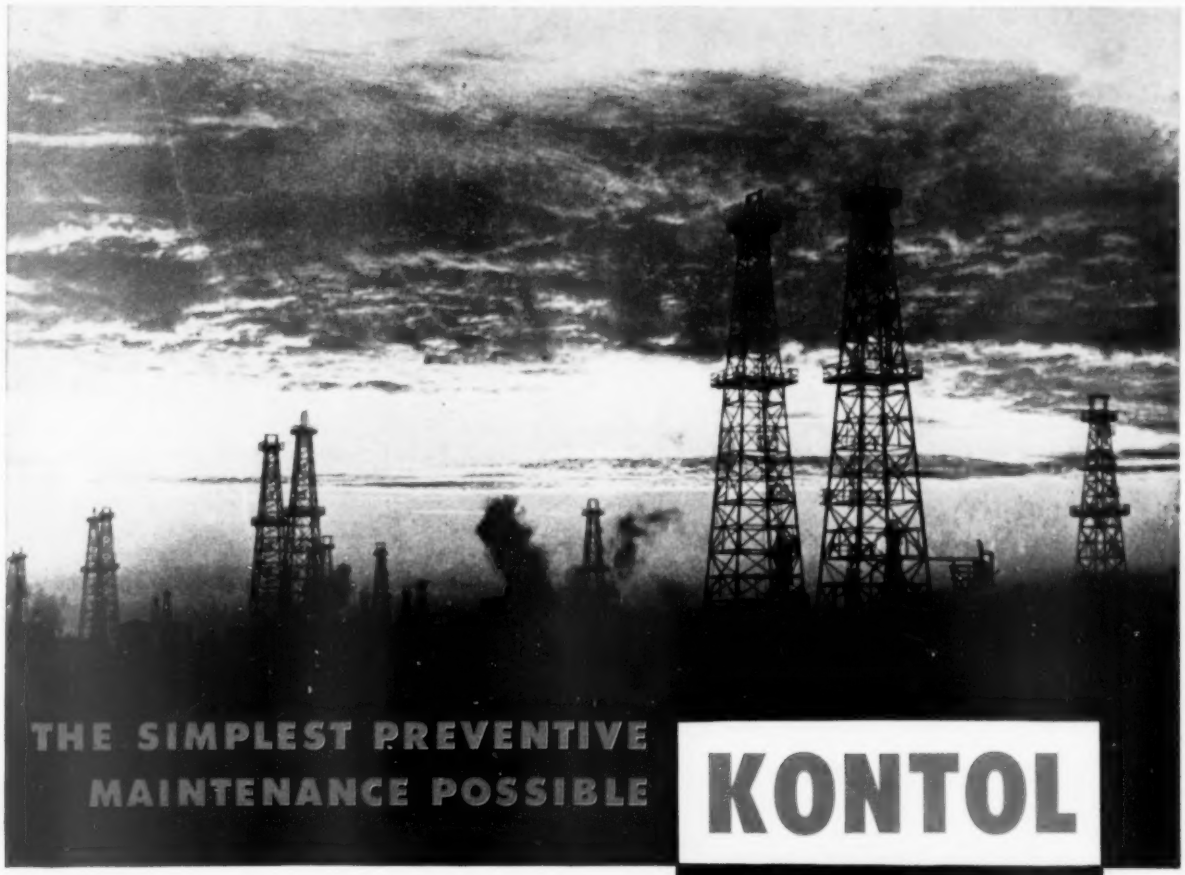
The large front tires (same size as used on rear wheels) help prevent side drift of the front end, and give higher front axle clearance.

Hydraulic booster and large front tires are STANDARD EQUIPMENT on Galion Grader Models 118, 104 and 203 (and available as "extras" on Model 303).

Write for literature.

THE GALION IRON WORKS & MFG. CO., General and Export Offices, Galion, Ohio, U.S.A.

Cable address: GALIONIRON, Galion, Ohio



KONTOL

CORROSION INHIBITORS

By preventing break-downs caused by corrosion damage, Kontol Corrosion Preventives enable you to keep your pumping units operating, reduce maintenance expense and produce more crude.

Kontol helps you cut maintenance costs, and it does so with maximum economy. With Kontol protection, you need not go to the expense of using high-cost special alloys or plastic-coated equipment; with Kontol, carbon steel equipment is adequate in most cases.

Kontol provides corrosion protection without adversely affecting other production procedures or endangering personnel—it doesn't complicate demulsification, it doesn't deposit formation-plugging precipitates, it is easy, convenient and completely safe to handle.

Kontol saves time. In addition to saving lost production time by preventing break-downs, Kontol is easy and simple to use. It can be pumped, lubricated or dumped down the well annulus, or used in convenient stick form in packed-off wells. It can be handled in the same manner as other oil-field treating chemicals—no goggles, gloves, aprons, masks or other protective devices are required.

Kontol's extended rate of protection and long effective life carry on over into surface equipment such as gathering lines, product lines and lease tankage. It is an excellent protection against corrosion in natural gasoline plants. Kontol has also proved very advantageous for use in treating secondary recovery flooding waters. In this service Kontol's corrosion inhibiting properties are augmented by its bactericidal action.

KF 53-3

For complete facts on Kontol, see your Tretolite field engineer or write to

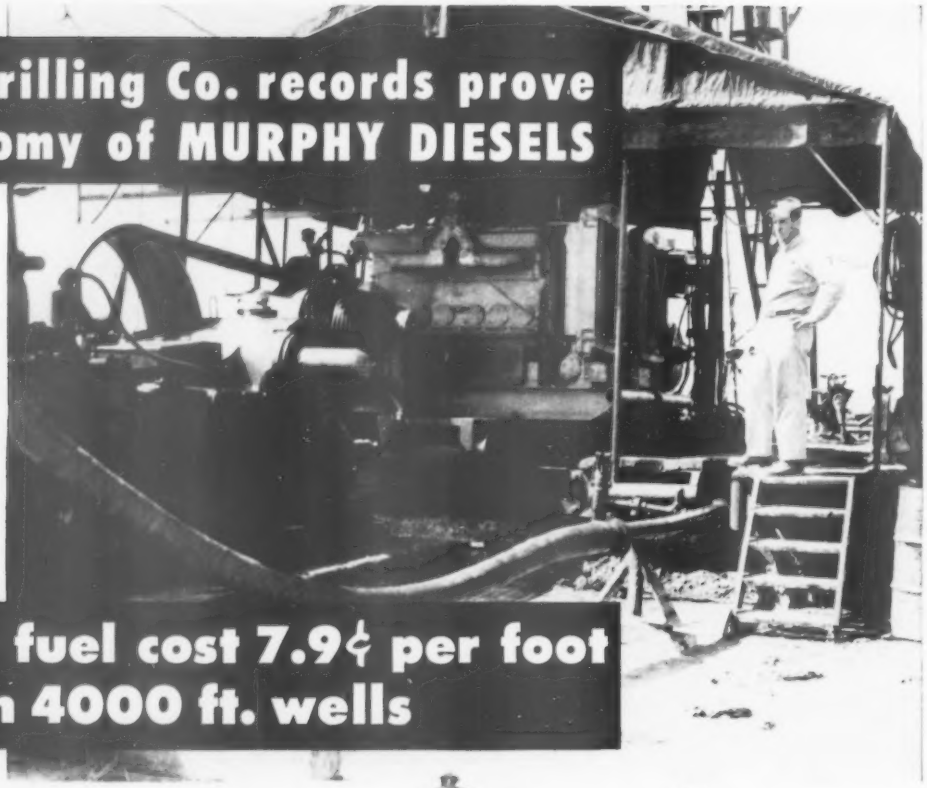
TRETOLITE COMPANY

Chemicals and Services for the Petroleum Industry

SAINT LOUIS 19, MISSOURI
LOS ANGELES 22, CALIFORNIA

DEHYDRATING • DESALTING • CORROSION INHIBITING • SCALE PREVENTING
PARAFFIN REMOVING • WATER DE-OILING

Powell Drilling Co. records prove the economy of MURPHY DIESELS

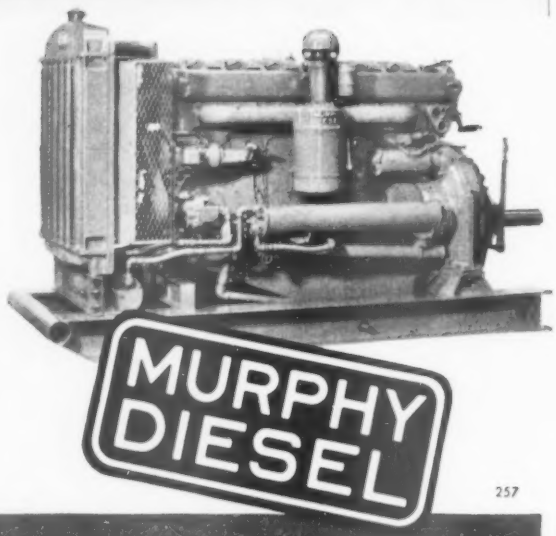


Average fuel cost 7.9¢ per foot for seven 4000 ft. wells

THE proof of an engine is in the drilling—and wherever Murphy Diesels are used they live up to their reputation for economy and rugged durability. Their economy is proved in their record for the first seven wells Powell Drilling Co. of Wichita, Kansas, drilled with their Emsco GB-350 rig with two 165 H.P. continuous Murphy Diesels. The seven wells in the Kansas area averaged 4035 feet. An average of 2757 gals. of fuel was used for each well at an average cost per well of $319.81. Carrying this out, fuel cost per foot of hole is only 7.9 cents!

In addition, Melvin Kiefer, Drilling Supt., says *"The engine response to throttle and load demands is exceptionally fast. If I were putting out a new rig today, I certainly wouldn't look any further for power."*

Why don't you take a look at Murphy Diesel Power for your rig? Your Murphy Diesel Dealer will give you full information.



257

MURPHY DIESEL COMPANY

5305 W. Burnham St. Milwaukee 14, Wisconsin

Tulsa Office—Sales, Parts and Service:
113-117 South Elwood Street, Tulsa, Oklahoma

Heavy duty power
for the oilfields

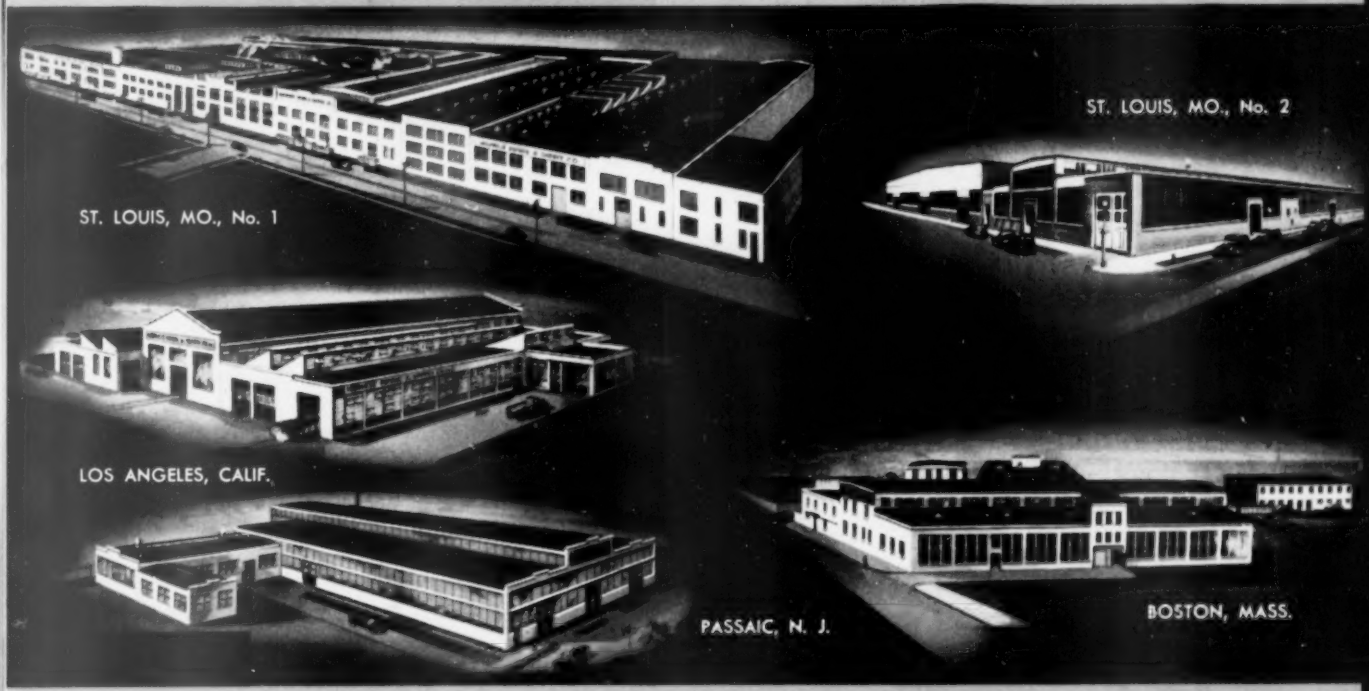
Murphy Diesel Engines and Power Units for drilling and pipe line pumping, 90 to 226 H.P., 1200 and 1400 RPM. Generator Sets, 60 to 140 K.W. Dual-Fuel Engines, 135 to 180 H.P. Also Crude Oil Burning Engines.

Users of Piping

whether a simple bend welded assembly or

complete piping systems for power plant or process

get Multiple Advantages from MIDWEST Multiple Plants



Strategically located multiple plants and large scale operations have made it economically practicable for Midwest to develop much special pipe fabricating machinery and to conduct piping research that would be impossible under other circumstances. Multiple plants create a friendly rivalry between the organizations of these plants that advances the art of piping fabrication more rapidly than would otherwise occur. All these activities are reflected in better fabricated piping . . . in greater piping value per dollar. • Multiple plants help make Midwest the preferred source for prefabricated piping. 4909

MIDWEST

PIPING COMPANY, INC.

(Formerly Midwest Piping & Supply Co., Inc.)

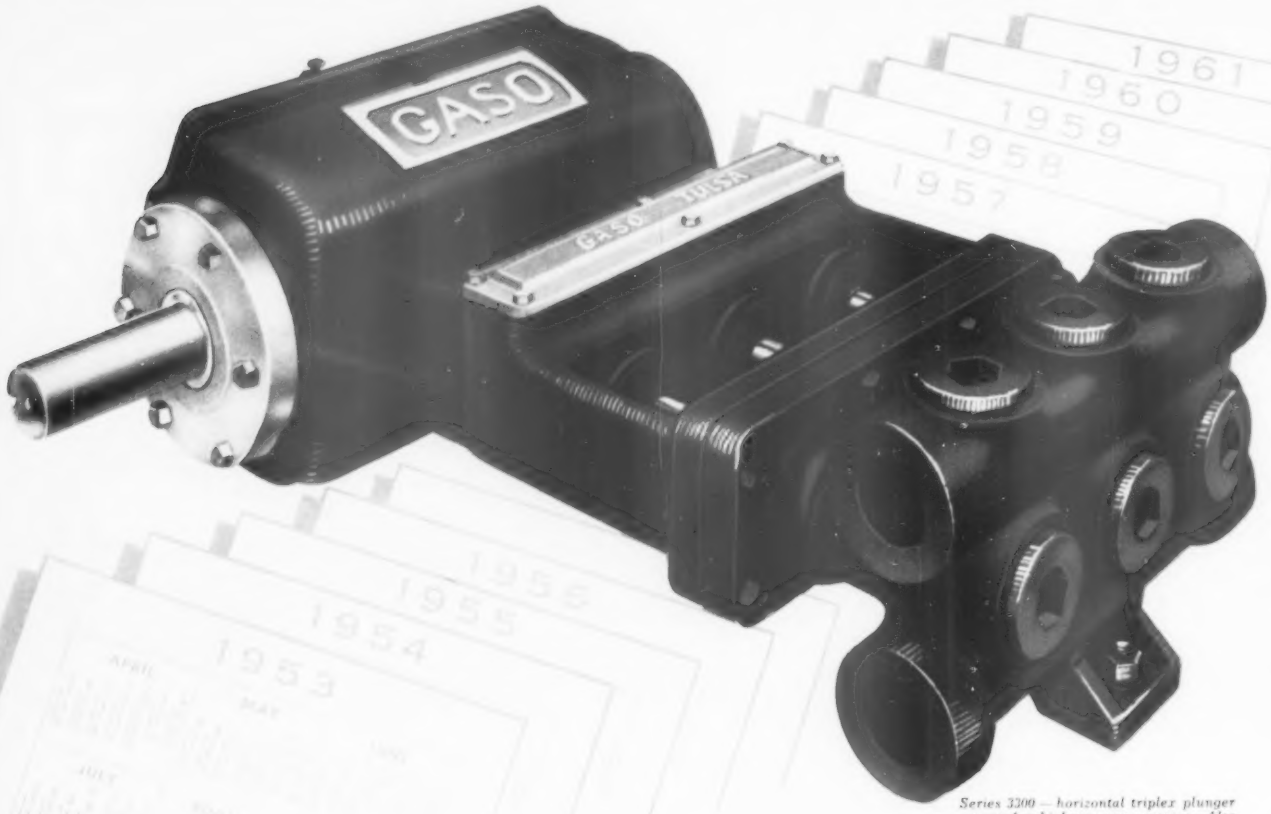
Main Office: 1450 South Second Street, St. Louis 4, Mo.

Plants: St. Louis, Passaic, Los Angeles and Boston

Sales Offices: New York 7—80 Church St.
Los Angeles 33—520 Anderson St.
Boston 27—426 First St.
Chicago 3—79 West Monroe St.
Tulsa 3—224 Wright Bldg.
Houston 2—1213 Capitol Ave.

PIPING FABRICATORS AND CONTRACTORS FOR MORE THAN 50 YEARS

WHY GASO PUMPS ARE FIRST IN THE FAVOR OF PIPELINE MEN



Series 3300 — horizontal triplex plunger pumps for high-pressure service. Also available for corrosive fluids.

Trouble-Free Performance

There is nothing accidental about the amazingly long life of Gaso Pumps. It is the planned result of engineering that extends to the minutest detail of design. Special-formula molybdenum alloy cast-iron, positive lubrication, big roller bearings, babbitt-lined shell bearings and a host of other features all contribute to service records that would be unbelievable if not supported by parts orders still received for Gaso Pumps installed more than a quarter-century ago. Ask for our latest catalog.

GASO PUMP & BURNER MFG. CO. 902 EAST FIRST ST., TULSA, OKLA.
EXPORT OFFICE: 149 BROADWAY, NEW YORK

Shreveport: W. L. SOMNER CO., 419 Lake Street • Los Angeles: 2529 Chambers St., Vernon • Western Canada: Lufkin Machine Co., Ltd., Edmonton, Alberta
Houston: PEDDLERS, Inc., 4401 Navigation Street

GASO PUMPS
for every oil industry need

A mighty *new* drilling line..

J&L STEEL Spring-Center

The new J&L SPRING-CENTER DRILLING LINE is one of those revolutionary improvements you wonder why some one didn't think of long ago.

The tightly coiled steel spring has nowhere to go. Over the sheaves and around the drum it stays right there like the hydraulic cushion in a shock absorber. Under surges of weight and pressure that might well crush any ordinary drilling line, this J&L line with the new SPRING-CENTER delivers the ton miles unharmed.

Extensive field tests on drilling wells have amply confirmed the remarkable endurance and dependability we expected of J&L SPRING-CENTER.

You'll want to know more, of course. Please 'phone your J&L supply store NOW!

PESA

JONES & LAUGHLIN STEEL CORPORATION
SUPPLY DIVISION

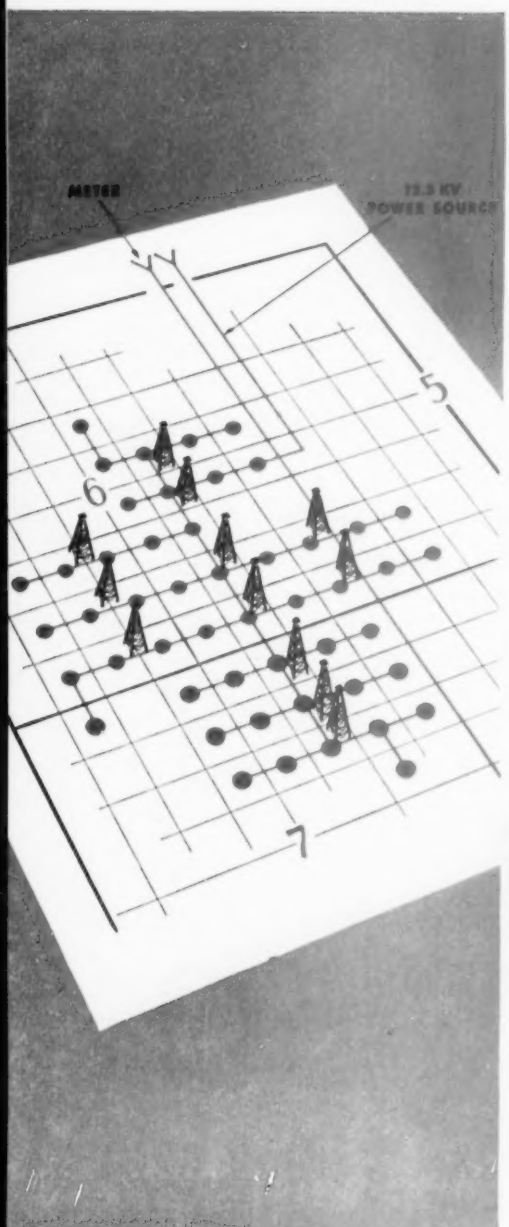
J&L STEEL

General Offices: TULSA, OKLAHOMA

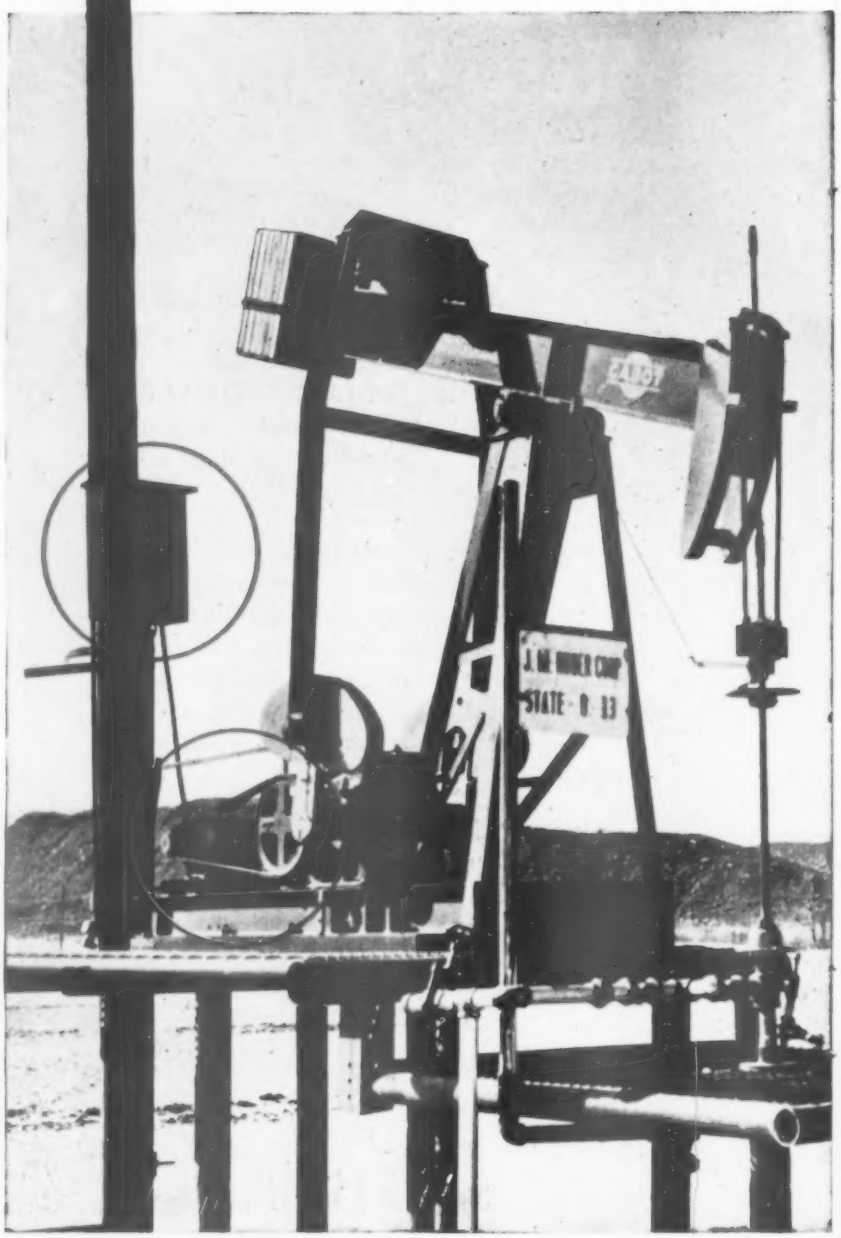
88 STORES • 19 OFFICES • 9 RESIDENT SALESMEN

EXPORT: 405 Lexington Ave., New York, N. Y., U. S. A.

They did what you can do to reduce costs



Cost of the complete power line for these 49 Oklahoma wells was only $378 per well. Pumping cost is only 4.1c per bbl.



This Westinghouse-equipped pumping rig operates in *blowing sand* in a dry river bed. However, it has given 100% performance!

An opportunity for major cost savings in petroleum production

Have you really studied the dollar and cents advantages of electrified pumping? Look at these two examples from the Westinghouse files.

Operates under severe conditions

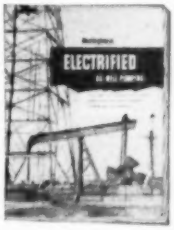
The photo at left shows a rig mounted on stilts in a dry river bed in Texas. The service conditions are terrible—sand blows constantly except during the rainy season when the river bed floods. Yet the Westinghouse motor and automatic time control have given 100% performance since they were installed two years ago. They haven't even required contact replacement. The automatic control cuts the motor in and out as desired, with just a rare check by the pumper.

Pumps 49 wells for only 4.1c per bbl

But you don't have to have unusually severe conditions to make electrified pumping pay. A study of 49 wells in the Healdton field in Oklahoma, shows pumping costs of *only 4.1c per bbl.* Westinghouse automatic time control staggers the pumping load so that power load is just 47% of total connected load. The whole 49 wells are handled by one combination pumper-electrician. And the installed cost of the power line was only $378 per well, including transformers.

Call Westinghouse for planning help

Determining the best pumping method over the long run requires a careful economic analysis. It's a costly mistake to select equipment simply on the basis of what is easiest or cheapest to set up initially. Westinghouse would like to help you make the type of study that will show whether *you* can make major cost savings in your petroleum production. Call us in.



DO YOU HAVE YOUR COPY of this valuable guide on oil well pumping? Write for B-4039, "Electrified Oil Well Pumping," Westinghouse Electric Corp., P.O. Box 868, Pittsburgh 30, Pa.

J-94908

YOU CAN BE SURE...IF IT'S

Westinghouse

EQUIPMENT FOR THE PETROLEUM INDUSTRY

BIG LOADS RIDE EASY

ON A *Mack's* BROAD SHOULDERS

It will pay you to find out what Mack six-wheel trucks can do to save money and boost profits on your job through unfaltering traction and faster, uninterrupted schedules.

That's because only Mack six-wheelers boast the unique advantages of Mack's exclusive Balanced Bogie and Power Divider . . . with all the benefits they give you in maximum flexibility, even tire loading, uniform braking, simplicity of design and positive traction regardless of the toughest terrain.

Write to us today for your free copy of booklet describing the Mack Balanced Bogie with Power Divider, or contact your nearest Mack branch or distributor.

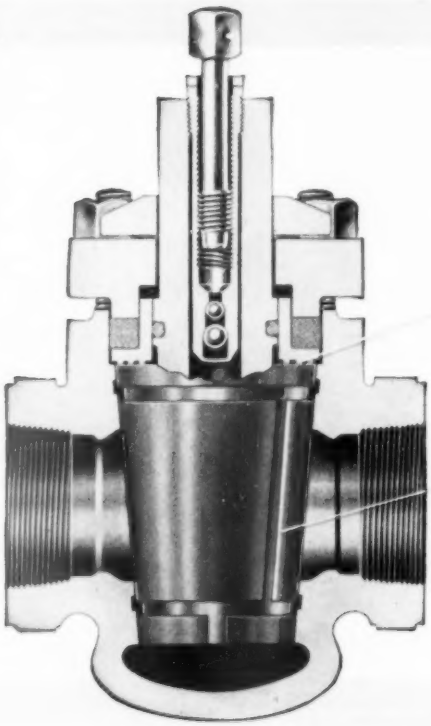
Mack TRUCKS

. . . outlast them all

Mack Trucks, Empire State Building, New York 1, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

Oh, I see

OIC now offers a complete line of Lubricated Plug Valves . . .



with two added features

1 Triple seal gives more effective sealing at shank with ease of turning.

2 Lubricant grooves that are never exposed to the flowing liquid.

OIC Tapered Lubricated Plug Valves assure positive, leakproof control of flow . . .

O-Ring . . . under initial compression, gives extra protection against leakage past shank.

Resilient Packing . . . completely enclosed in nonrotating metal parts, tends to seat the plug tightly in body without excessive cover tightness.

Labyrinth Seal . . . series of concentric rings on gland collar make firm contact between collar and top of plug face, providing additional seal.

2 Vertical Lube Grooves . . . 180° apart. When plug is given quarter turn, neither of these grooves is exposed to liquid flow.

Lubricant Chamber . . . under pressure from screw piston, lubricant creates upward force during lubrication, tending to free plug for easy turning.

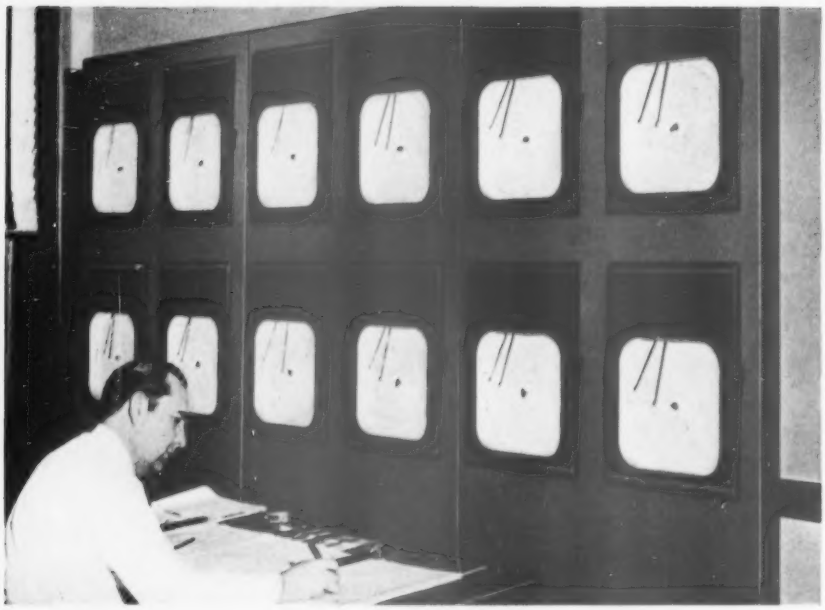
Plug Lapped to Body . . . to assure perfect, leakproof fit.

Order in semisteel or steel . . . from your local OIC Distributor. Write for literature describing the advantages of OIC Lubricated Plug Valves.

OIC FOUNDED 1883

THE OHIO INJECTOR COMPANY • WADSWORTH, OHIO

VALVES | **FORGED & CAST STEEL, IRON & BRONZE, LUBRICATED PLUG VALVES**



Metameter Telemeter Receivers in dispatching office, Midland Building, Kansas City, Mo., record suction and discharge pressures and static and differential pressures coming in by microwave from distances nearly 400 miles away. They give dispatcher a continuous visual picture of pressure conditions along Panhandle Eastern Pipe Line system.

MICROWAVE METAMETER TELEMETERING on the PANHANDLE EASTERN pipe line

Gives dispatcher the information he needs for better pressure regulation—enables him to foresee abnormal conditions and prevent interruptions—promotes greater operating efficiency

Bristol Metameter* Telemeters, using microwave transmission over some 400 miles of this company's pipe line system, bring readings of compressor suction and discharge pressures and static and differential pressures to the Kansas City dispatching office where they are recorded by 12 Metameter receivers within sight of the dispatcher.

Continuous information about suction and discharge pressure at Houstonia, Centralia, Pleasant Hill, Glenarm, and Tuscola, Ill., compressor stations and static and differential pressures at Tuscola enables the dispatcher to obtain better pressure regulation and to foresee abnormal situations and make corrections before they cause interruptions. Continuous observation of pressures along the pipe line system promotes economies and a feeling of security.

Metameter Telemeters are widely used with microwave radio communication systems. Provisions for future use or additional Metameter Telemeters are made on many microwave systems at the time of installation.

Other uses by pipe line companies include remote setting of regulators and flow controllers; remote readings of line pressure; sounding low and high pressure and flow limits alarms; totalizing flow through several lines.

For further information on the use of Bristol Metameters by pipe line and gas companies, from coast to coast, request Bulletin M1700, THE BRISTOL COMPANY, 120 Bristol Road, Waterbury 20, Conn.

*Reg. U. S. Pat. Off.

BRISTOL

The dependable Guidepost of Industry

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

CUPRO NICKEL, 30%-702

for your toughest heat exchange problems

CUPRO NICKEL, 30%-702, is the best and most widely used copper alloy for tubes in refinery heat exchangers operating under the severest conditions—where corrosive materials and cooling waters must be handled at relatively high temperatures and pressures.

In refinery heat exchanger equipment, tubes of Cupro Nickel, 30%-702, retain strength at relatively high operating temperatures and are resistant to stress-corrosion cracking. The alloy has the property of forming protective films of corrosion products, making it particularly desirable for service where sea water, even at relatively high velocities, is used for cooling.

Our Technical Department will welcome the opportunity to investigate your heat exchanger tube problem and to draw upon its long experience in tube performance to suggest the most suitable alloy. Feel free to use this service. Use the coupon below for your copy of Publication B-2, "ANACONDA Tubes and Plates for Condenser and Heat Exchangers."

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Nearly 50 years of service on the world's toughest jobs

Spicer *looked ahead* in 1904 when it introduced the first successful universal joint for automobiles.

Spicer has *always looked ahead* . . . continually developing universal joint refinements that have anticipated new needs in automotive service.

Spicer *is ahead today* . . . with outstanding design features in its flange- and yoke-type line of universal joints . . . with a greater number of units in service than any other make . . . and with an unequaled performance record of nearly a half-century in all types of vehicles on all types of duty.

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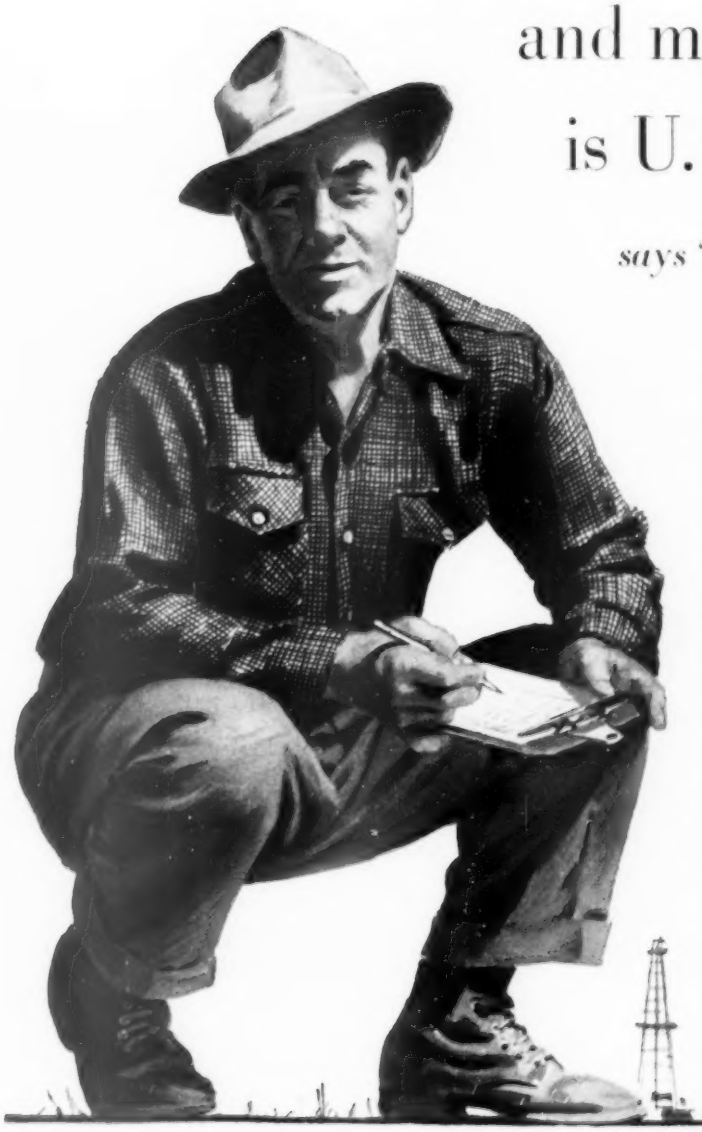
Division of Dana Corporation • TOLEDO 1, OHIO

48 YEARS OF Spicer SERVICE

TRANSMISSIONS • UNIVERSAL JOINTS • BROWN-LIPE AND AUBURN CLUTCHES • FORGINGS • PASSENGER CAR AXLES • STAMPINGS • SPICER "BROWN-LIPE" GEAR BOXES • PARISH FRAMES • TORQUE CONVERTERS • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES

"I'm always fighting down-time..... and my best weapon is U.S. Royal 4,"

says "Red" Royal



"I've got better use for my boss' dough," says Red, "than tying it up in extra equipment and standby hose. I'm fed up with switching, lubrication and down-time because of hose. For me, I'll take U.S. Royal 4 Rotary Hose – it can take drilling pressure of today's pumps and *handle every job all the way from spud to pay.*"

"Red" is right on the button. Another reason why he likes Royal 4 is because it comes shipped in a special crate – a mighty convenient container when you're moving from rig to rig.

Developed by Science—
Proved by Drillers

Available in all FIELDS at SUPPLY STORES

PRODUCT OF U.S. RUBBER — SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

here's why

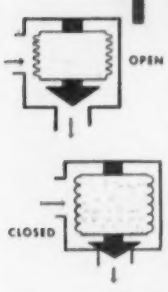
they selected 4 different types of steam traps for 4 different applications

CONDITIONS under which steam traps must operate vary widely, but there is for every service one type that gives maximum efficiency.

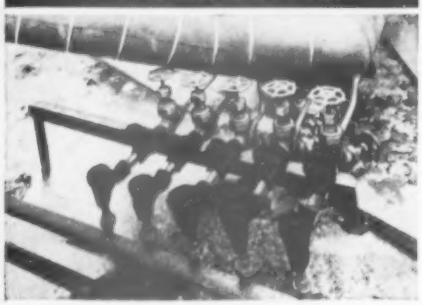
Sarco makes the 4 distinctly different TYPES of steam traps shown below. Therefore, Sarco can give you *impartial* advice on the best choice for your particular installation.

For each of the 4 jobs listed below, the users selected four different TYPES of Sarco traps.

CASE NO. 1



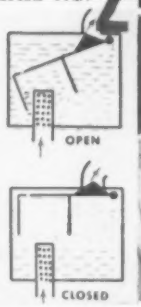
Draining outside tracer lines in an oil refinery in New Jersey



Type of traps installed: Sarco No. 9 thermostatic traps.

Why selected: Being thermostatic, they are steam misers. Can't freeze, being wide open when cold. Easy to maintain since only the bellows moves. Small, light and easy to install. Self-adjusting for different pressures.

CASE NO. 2

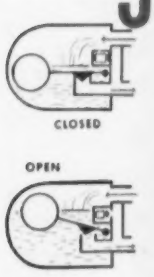


Draining platens of compression plastic presses

Type of traps installed: 100 Sarco Inverted Bucket traps in service for 17 years.

Why selected: Press platens have small horizontal steam spaces; the intermittent blast discharge of these Sarco traps scours the heating surface. Built-in strainer cuts maintenance costs.

CASE NO. 3

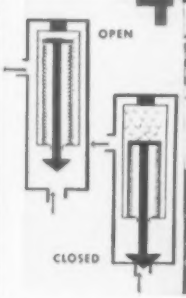


Draining heating coils of a milk evaporator

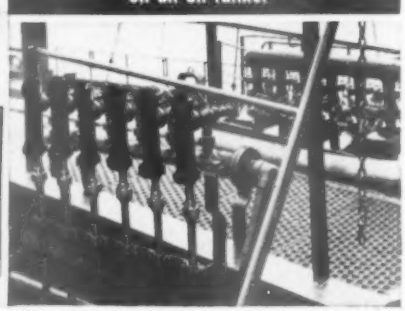
Type of trap installed: Sarco Float-Thermostatic Trap.

Why selected: Heating surfaces of the coils must be kept full of live steam – this Sarco trap discharges condensate as it collects. Can't airbind because the integral thermostatic vent gets rid of air, regardless of operating steam pressure and temperature. As shown in sketch 3 above, this vent does *not* depend upon the discharge of condensate.

CASE NO. 4



Draining heating coils on an oil tanker



Type of traps installed: Sarco LIQUID EXPANSION traps No. 871.

Why selected: Traps on tankers are exposed to freezing weather and vibration. Sarco's No. 871 traps can't freeze; resist vibration, water-hammer, pressure pulsations and superheat. These traps discharge condensate at adjustable temperatures below 212°F., permitting use of some of the condensate's sensible heat.

● Write today for Bulletin No. 145-A: *Selecting the Right TYPE Steam Trap.* Sarco Company, Inc., Empire State Bldg., New York 1, N. Y. Represented in principal cities. Sarco Canada Ltd., Toronto 8, Ontario.

408

SARCO saves steam

improves product quality and output

SUPERMARKETS

for the Petroleum Industry

The glamour and bustle of Tulsa have now given way to the serious business of keeping the supermarkets stocked, and the supply lines filled, with all of the new National Supply products shown at the International Petroleum Exposition.

But these are only a few of the products carried in stock at 113 National Supply Stores — supermarkets for the petroleum industry. You'll find thousands of other operating, maintenance, and safety items at the National Supply Store nearby. Outside the United States and Canada these thousands of items of oilfield equipment are distributed by National's Export Division — a world-wide supermarket for the world-wide petroleum industry.

As always, there's a program of research and development under way at all of the National Supply manufacturing plants. New and improved drilling and production machinery and supplies will be available when the industry needs this equipment because field engineers are constantly in touch with oilfield developments, everywhere.

That's why it's so worthwhile to keep in touch with your National Supply Store where you'll find everything that's new and everything that's standard in drilling and production equipment and supplies.

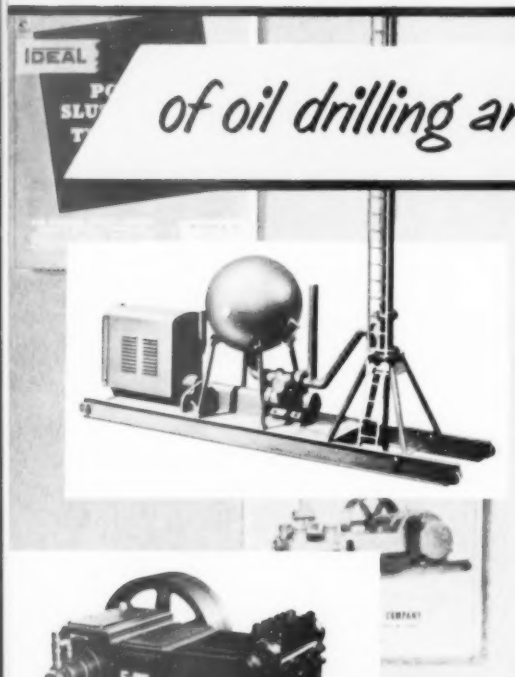
THE NATIONAL SUPPLY COMPANY

PITTSBURGH 30, PENNSYLVANIA

Here's a partial stock guide
IDEAL
POWER SLUSH PUMP
TYPE E-700
E-500
ENGINE

to the most extensive line

of oil drilling and production equipment...



THE NATIONAL BLUE LINE

New products and improved equipment are being added to the "NATIONAL BLUE" line constantly—you saw some of the latest at the International Petroleum Exposition, or read of them in the National Supply Company brochure.

But there will never be space enough in an exhibit to show every member of every family of equipment in the complete line of oilfield machinery available at National Supply.

In addition to the rigs, pumps, pumping units, derrick equipment, engines, and other machinery displayed at Tulsa there are dozens of others, and hundreds of combinations of "National" and "Ideal" equipment built to work together for efficient drilling and production.

Product bulletins have been prepared on all the new and improved National and Ideal equipment to help you select the units and combinations for your needs. Write Pittsburgh for copies, or ask at your National Supply Store.

THE NATIONAL SUPPLY COMPANY

PITTSBURGH 30, PENNSYLVANIA

DIVISION OFFICES: Denver; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance

CANADA: The National Supply Company, Ltd., 200 F. W. Clark Bldg., 709 Eighth Avenue, West, Calgary, Alberta

EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London E.C. 2

NATIONAL BLUE PRODUCTS

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

. . . and here are the latest additions to the most extensive line of oil country tubular products

SPANG

EXTREME LINE TUBING

SPANG

GRADE P-110 EXTREME LINE CASING

The increase in deep drilling activity, and the forecasts of still more deep wells and more difficult formations, were primary considerations when Spang field and laboratory engineers and research specialists set to work to develop tubing and casing of exceptionally high joint strength and high leak resistance.

You probably saw the results at Tulsa — the latest additions to the Spang family, Extreme Line Tubing and Grade P-110 Extreme Line Casing. Most important, these two new Spang Tubular Products are now available for use in the really tough jobs of completion and production in deep wells and complex formations.

Bulletins on these new Spang products, as well as on the extensive line of Spang Oil Field Tubular Products, are now available. Write Pittsburgh or ask your Spang-Chalfant representative for copies.

Spang-Chalfant Division

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NATIONAL BLUE PRODUCTS

FARREL®

can supply the speed increaser YOU NEED

Since 1932, Farrel has worked closely with the oil industry in designing speed increasers to meet the *unusual* as well as the *usual* requirements of pipeline pumping service.

The standard line consists of 49 sizes with speed ratios ranging from 1:1 to 12:1. For higher ratios, double step-up units are supplied with ratio range from 12:1 to 40:1.

Two-pinion units, designed to transmit power from a single engine to two pumps, are also available. These can be furnished with any gear ratio required.

Units for outdoor service have been developed for successful operation under the most adverse conditions—continuous heavy-duty operation, dust, rain, sandstorms, severe heat and intense cold.

For further details of these designed-for-the-job speed increasers, send for a copy of bulletin 448A. No cost or obligation.

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ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Akron, Detroit, Chicago, Memphis, Minneapolis, Portland (Oregon), Los Angeles, Salt Lake City, New Orleans.

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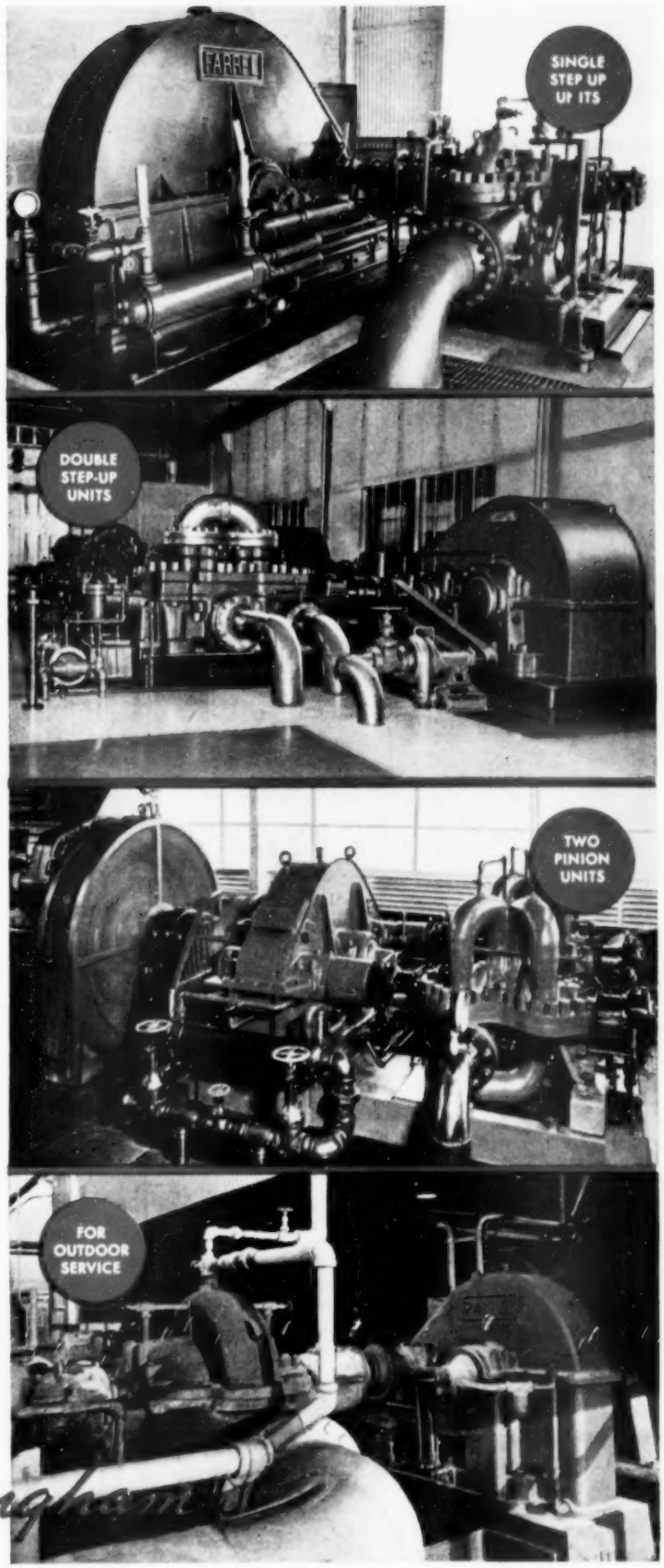
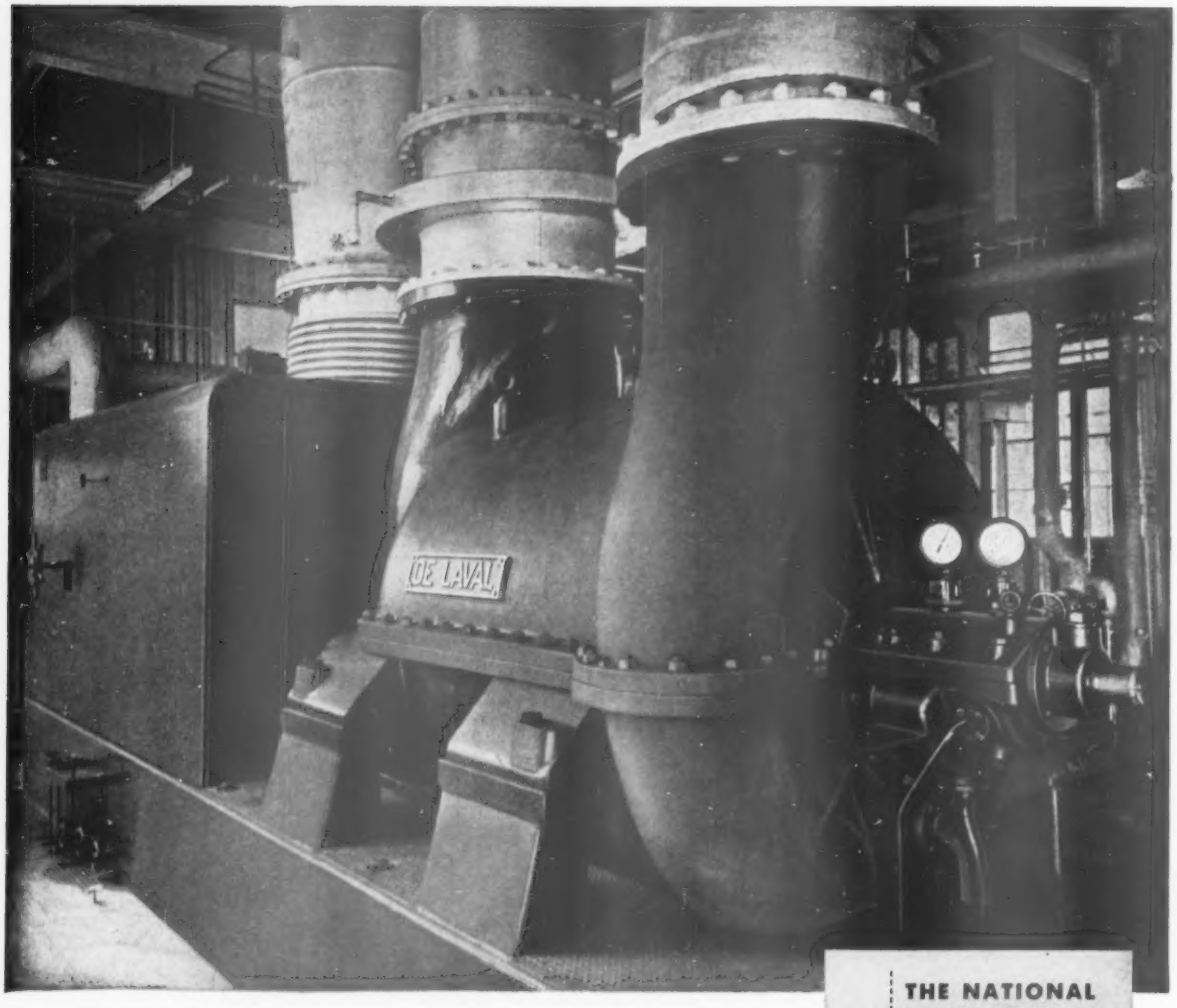
OIL FIELD REPRESENTATIVES: Hercules-Lupfer Engine Sales Company, 124 N. Boston St., Tulsa 1, Okla. V. W. Osborne, 860-A M&M Building, Houston 2, Texas.

FB-826

Farrel-Birmingham





This blower never takes a "breather"

at **THE NATIONAL COOPERATIVE REFINERY ASSOCIATION**

There's no time out for this De Laval turbine-driven blower at the McPherson, Kansas fluid catalytic cracking plant of the National Cooperative Refinery Association. Twenty-four hours a day this 21,500 cfm, 2,270 hp unit handles air for regeneration of the spent catalyst.

There are good reasons for this power-saving dependability. This heavy-duty machine is built to take punishment. Its rugged casings, husky, perfectly balanced rotor and externally mounted, cylindrically seated bearings are design features that reduce maintenance and insure continuous operation for long periods of service. And remember, there's no divided responsibility—both turbine and blower are De Laval designed, and De Laval made.

De Laval blower experience covers a wide range of industries — steel, refining, metal mining, chemical processing, high pressure gas transmission, manufactured gas, sewage aeration and many others. And all this engineering and manufacturing experience is ready to solve your specific blower application. Discuss it with a De Laval representative.

Send for Bulletin 0500 containing complete data

DE LAVAL *Centrifugal Blowers*

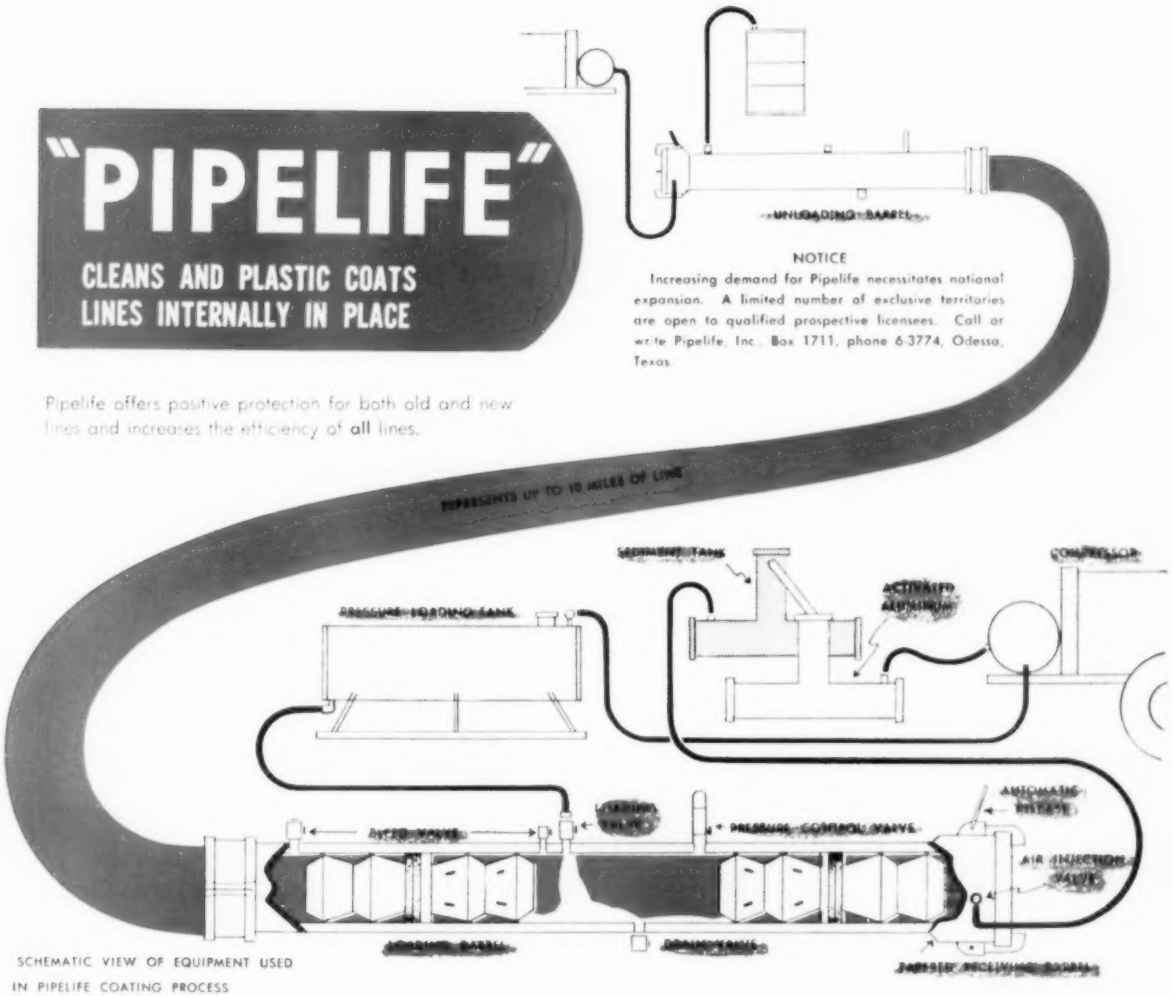
DE LAVAL STEAM TURBINE COMPANY
810 Nottingham Way, Trenton 2, New Jersey

DL-129

"PIPELIFE"

CLEANS AND PLASTIC COATS LINES INTERNALLY IN PLACE

Pipelife offers positive protection for both old and new lines and increases the efficiency of all lines.



SCHEMATIC VIEW OF EQUIPMENT USED IN PIPELIFE COATING PROCESS

NOTICE

Increasing demand for Pipelife necessitates national expansion. A limited number of exclusive territories are open to qualified prospective licensees. Call or write Pipelife, Inc., Box 1711, phone 6-3774, Odessa, Texas.

Pipelife incorporates the advantages of both steel and plastic pipe at a cost far below that of any other maintenance or reconditioning method known. Pipelife process cleans and plastic coats pipelines internally, in place, and restores them to new-pipe efficiency at a cost far less than that of replacing or reconditioning deteriorated lines. The Pipelife process protects lines against corrosive elements in oil, gas or water for unlimited years of service without further maintenance. Install 'em . . . Pipelife 'em . . . forget 'em.

No line is too difficult to be cleaned and processed the Pipelife way. Condemned lines considered too far gone for reconditioning under other methods have been cleaned, repaired, plastic-coated and restored to service by the Pipelife process. Lines cleaned and coated by this process have been in service 5 years to date without further maintenance costs.

NEW LIFE FOR OLD LINES
LONG LIFE FOR NEW LINES
MORE LIFE FOR ALL LINES

PAYS BIG DIVIDENDS
INTERNAL PIPELINE MAINTENANCE

Pipelines are the lifelines of the nation. Protect them — the Pipelife way.

PIPELIFE, INC.

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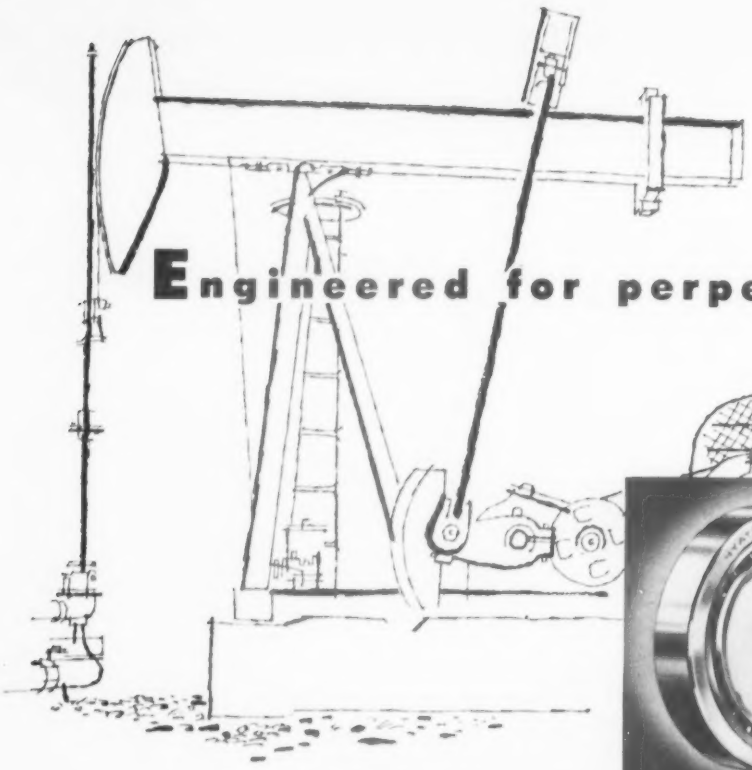
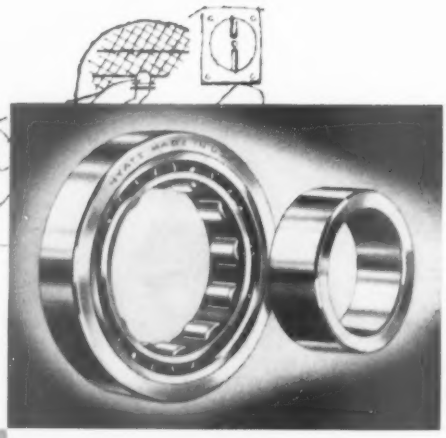
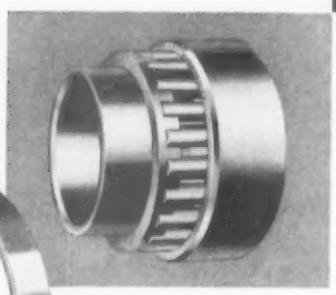
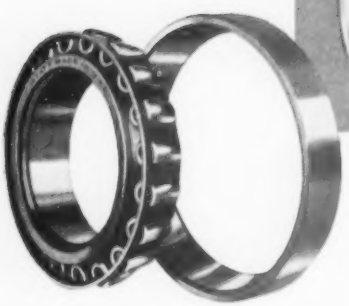
Engineered for perpetual motion!









When the pumping unit stops, so does production—and every hour of down time sends costs soaring. That's why dependable Hyatt Roller Bearings have long been foremost in the oil field—preferred by equipment builders and buyers throughout the industry. They know that with Hyatts "built in," pumping units, drawworks, rotaries, blocks, engines—all types of field equipment will "stand up" for months—even years—of continuous operation. Hyatt Roller Bearings are performance-proved to last longer at peak operating efficiency, reducing costs as they reduce friction. Whatever the radial load problem, there's a Hyatt bearing to best fit the application—for Hyatt offers the most complete line of radial roller bearings available anywhere. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

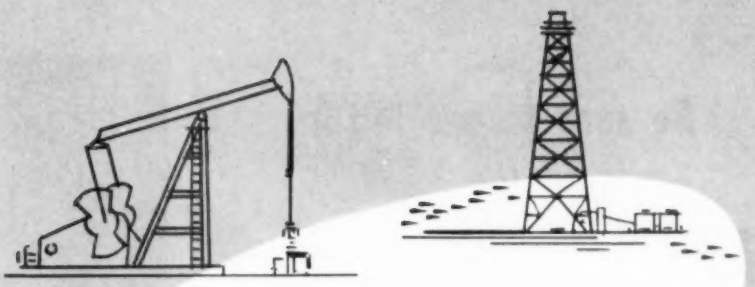
During the Oil Show

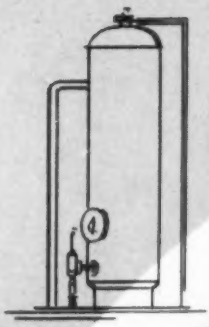
VISIT THE HYATT DISPLAY,

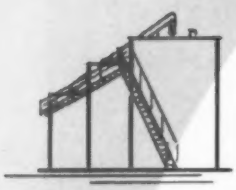
a feature exhibit in the

General Motors Building

HYATT ROLLER BEARINGS







PETROLEUM EQUIPMENT and Supplies from

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PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION
PARTNERS IN PETROLEUM PROGRESS

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THE Bovaird SUPPLY COMPANY

GENERAL OFFICES
TULSA, OKLAHOMA

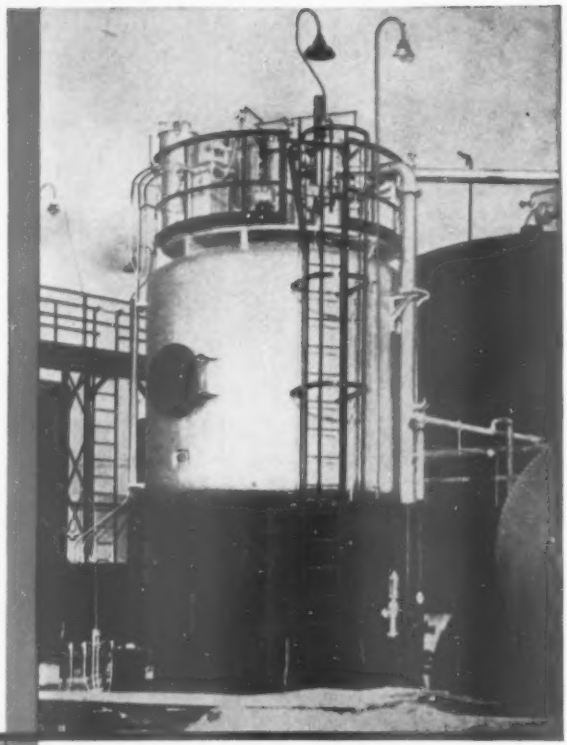
82 YEARS OF PROGRESS WITH THE OIL INDUSTRY

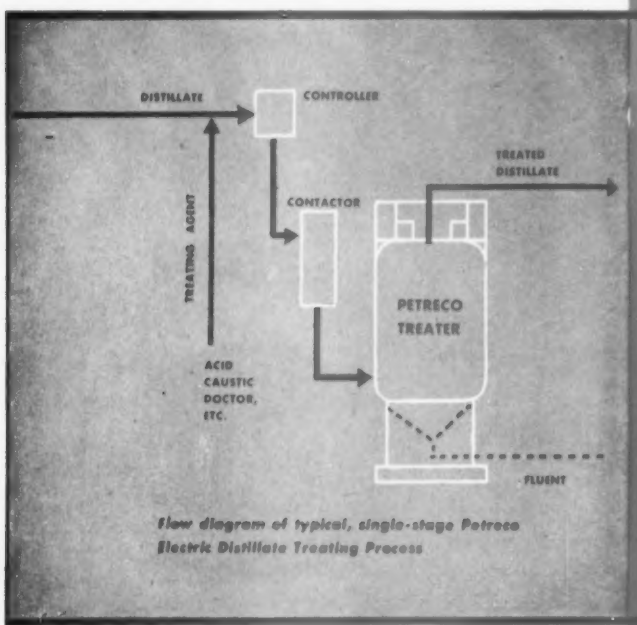
Be sure to get the facts on the NEW

PETRECO

ELECTRIC DISTILLATE TREATING PROCESS

The new Petreco Electric Process takes the guesswork out of distillate treating. It is applicable to acid, alkali or doctor treating of distillate stocks such as naphtha, gasoline, kerosine, cat-cracker charges, cat-cycle oils, diesel fuel and furnace oil.





Flow diagram of typical, single-stage Petreco Electric Distillate Treating Process

ADVANTAGES

COMPACT — requires minimum space, minimum equipment.

ECONOMICAL — uses less treating agent, gives higher product yield.

AUTOMATIC — injection, contacting and separation are automatically precision-controlled.

RELIABLE — the automatic, precision-control assures definite, predictable results.

EFFICIENT — treated distillate is relatively free of pepper-sludge, caustic, doctor solution.

POSITIVE — assures a quick break and complete separation. Amount of acid-sludge is reduced and is more suitable for re-use or recovery; emulsion in caustic effluent is eliminated; no blackstrap is formed in doctor treating.

NON-POLLUTING — the system is entirely closed. There is no chance for irritating fumes to escape.

COMPLETE — water washing is eliminated, except in some unusual cases.

EASILY MAINTAINED — the closed system, with no moving parts, stays clean; does not break down.

PETRECO

ELECTRIC PETROLEUM PROCESSING

CRUDE OILS: REMOVAL OF SALTS, SOLIDS, OTHER IMPURITIES; DEHYDRATING

DISTILLATES: ACID TREATING; CAUSTIC TREATING; DOCTOR TREATING

FUEL OILS: DESAPONIFICATION, ASH REMOVAL

For complete information, call or write

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PETRECO DIVISION

3202 South Wayside Drive, Houston 1, Texas

1390 E. Burnett Street, Long Beach 6, California

PD 55-1

MARTIN-DECKER WEIGHT INDICATORS

are Hydraulically Operated . . . so are the brakes on your car!

Both Achieve Results Superior to those possible with Mechanical Actuation

The MARTIN-DECKER TYPE "D" WEIGHT INDICATOR and the IDEAL TYPE "D" WIRE LINE ANCHOR Provide the ultimate in Accurate—Sensitive Dependable—Rugged DRILLING CONTROL And WIRE LINE ANCHORING

Consider These Advantages

of the Martin-Decker Hydraulic Weight Indicator

- Greater Accuracy (No mechanism to wear out or get out of adjustment).
- More Flexibility.
- Weight Indicator can be located remotely from source of pressure.
- Weight Indicator can be located advantageously for the driller where he can read it.
- Adaptable to all types of rigs and conditions.

Martin-Decker Weight Indicators Are

SEALED

For Greater Accuracy and Service

No pumping up . . . No adjusting . . . No leaks. The Fluid System is factory loaded and permanently sealed. The fluid remains in the unit even during transportation and storage. Fast, foolproof installation—Guaranteed Accuracy.

Martin-Decker Hydraulic Weight Indicators are noted for their

SIMPLICITY • DEPENDABILITY • ACCURACY • SENSITIVITY • ADAPTABILITY • SMOOTH OPERATION • UTILITY AND FLEXIBILITY • LONGEVITY • Many Martin-Decker Weight Indicators are in use that are 20-25 years old.

HOME OF THE WEIGHT INDICATOR

MARTIN DECKER CORP.

LONG BEACH, CALIFORNIA

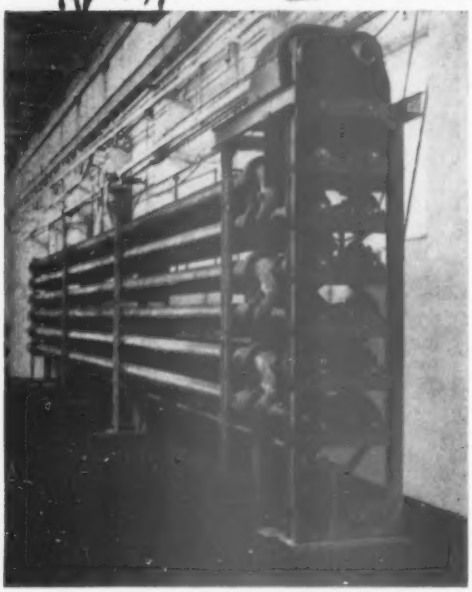
SAN JOAQUIN VALLEY: T. J. CULLEN, BAKERSFIELD, CALIFORNIA
MID CONTINENT DISTRIBUTOR: REED ROLLER BIT COMPANY, HOUSTON, TEXAS
CANADIAN DISTRIBUTOR: REED ROLLER BIT COMPANY OF CANADA, LTD., CALGARY & EDMONTON, ALBERTA

MARTIN-DECKER WEIGHT INDICATORS AND IDEAL WIRE LINE ANCHORS ARE ALSO SOLD THROUGH THE NATIONAL SUPPLY EXPORT CORP., THE NATIONAL SUPPLY CO. AND OTHER RECOGNIZED SUPPLY HOUSES.

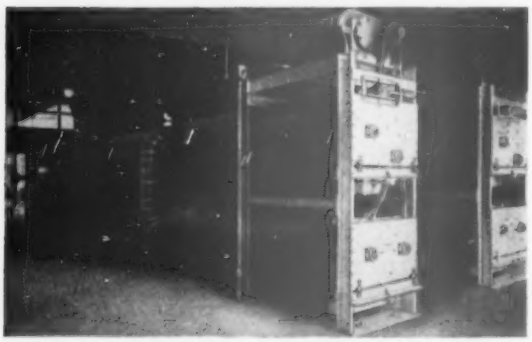
Keep Heat Transfer Surfaces CLEAN...

SPECIFY Vogt

SCRAPED SURFACE *Exchangers*



*DOUBLE PIPE UNIT. Drive end close-up of 12 section unit under test in our shop.



*SHELL and PIPE UNITS. Two of five units installed in a leading petroleum refinery.

*Patented

IF you are all "gummed up" with a tough heat transfer problem, Vogt Scraped Surface Exchangers will provide the answer. They have patented scraper elements which prevent fouling of the heat transfer surfaces and insure the highest rate of heat exchange between the product and the cooling or heating medium. The scrapers also continuously agitate the fluid and assist removal of solids from the unit.

DOUBLE PIPE EQUIPMENT is available in two types; EXCHANGERS, for cooling with water, brine, and cold filtrate, and for heating with steam or hot liquids; and CHILLERS, for use with volatile refrigerants such as ammonia, propane, and Freon. Both types have 8" jacket pipes and 6" inner pipes with scrapers.

SHELL AND PIPE TYPE UNITS are designed for use with volatile refrigerants and for heating fluids with steam or similar heating mediums. They consist of large welded shells each containing seven 6" scraped pipe sections.

Vogt Scraped Surface Exchangers serve profitably as oil chillers, crystallizers, and heaters in many processes in the petroleum and chemical industries. Their application to your heat transfer problems will receive the prompt attention of our Engineering staff.

Write for Bulletin PE-1

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Constructive criticism, the cooperation and help toward the improvement of our product has been of real assistance to us and has in turn been a contribution toward the advancement of Modern Production Equipment.

We acknowledge the assistance of our many friends and to those who have had a part in this development we express our keenest appreciation.

30 Years Experience

IN DEVELOPING AND BUILDING OVER 40,000 PUMPING UNITS HAVE MADE LUFKIN THE SYMBOL OF *Top Quality*

Lufkin FOUNDRY & MACHINE COMPANY

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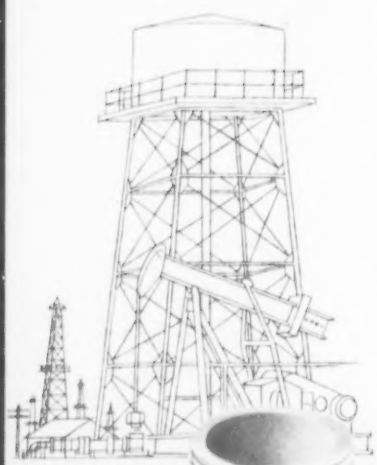
FOR WATER SYSTEMS IN THE OIL COUNTRY

SPANG "CW" STEEL PIPE



Need a water piping system at your well site? You'll be ahead with SPANG "CW" Steel Pipe obtainable through your nearby National Supply Store.

For all oil country piping—water systems, oil-gathering systems, or gas piping, salt water disposal lines, air lines, water flooding lines—SPANG "CW" is always a good buy. In the first place, it's a dependable SPANG product—secondly, it has an established reputation for oilfield serviceability.

Furthermore, SPANG "CW" Steel Pipe is normally available through your National Supply Store in a complete range of standard sizes.

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SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

NATIONAL BLUE PRODUCTS

LOADING — High reverse speeds and power-boosted steering make these "PAYLOADERS" big producers on loading work . . . have dumping height to load big trucks.

DIGGING — Sump pits, drilling sites and other grading and excavating tasks are regular assignments for 4-wheel-drive "PAYLOADERS" . . . are driven quickly to the job.

BACKFILLING — The regular bucket is widely used for fast backfilling work, but this blade attachment is also available.

CARRYING — This Crane Hook is one of several attachments that greatly multiply "PAYLOADER" usefulness.

MASTER OF MANY JOBS

Big 4-wheel-drive "PAYLOADERS" are proving their value and versatility in the oil industry as they have in so many others. They're multi-purpose handymen for the pipe liner, the driller and refiner . . . can excavate, load trucks and backfill trenches . . . build fire walls, grade and spread . . . pull, push, lift and carry. These outstanding tractor-shovels have four speeds in reverse as well as forward, ranging from a powerful 2 M.P.H. crawl up to 27 M.P.H. transport speed.

They've got power-boosted steering . . . full hydraulic fingertip bucket control . . . automatic tip-back bucket motion . . . unsurpassed operator visibility. And there's a choice of gasoline or diesel power up to 90 H.P. Once you've seen a "PAYLOADER" in action, you'll realize what they can do on *your* jobs. See your "PAYLOADER" Distributor today or write The Frank G. Hough Co., 749 Sunnyside Ave., Libertyville, Illinois.

WRITE for full information on any of the "PAYLOADER" models: Four-Wheel Drive HM — 1½ yd. and HR — 1 yd.; Rear Wheel Drive Models HY — 1¼ yd., HF — ¾ yd., HE — ½ yd.; Front wheel drive Models HAH — 15 cu. ft., HA — 12 cu. ft.

SAY "HUFF"

PAYLOADER®

THE FRANK G. HOUGH CO. SINCE 1920

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IT'S A JOB FOR

CON

ANY JOB — large or small, complex or routine — is just the job for Procon. That fact has been demonstrated on a wide range of work . . . all over the map. Whether it's major refinery processing units, auxiliary equipment, outside facilities, or turnarounds on processing units . . . you can call on Procon with complete confidence. You will be repaid with efficient, economical, and altogether successful handling of every detail.

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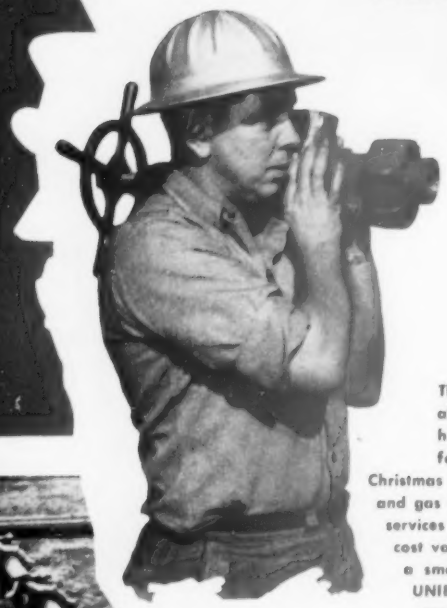
PROCON

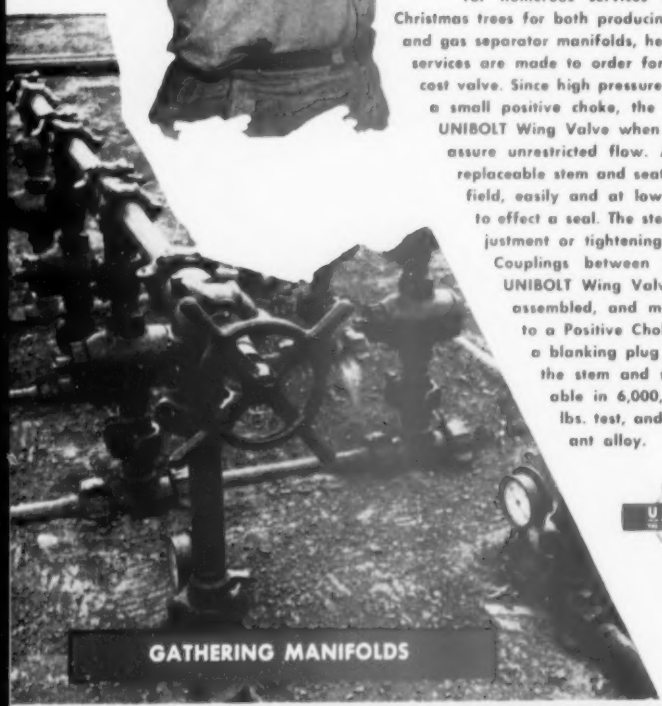
wherever flow control is important

UNIBOLT

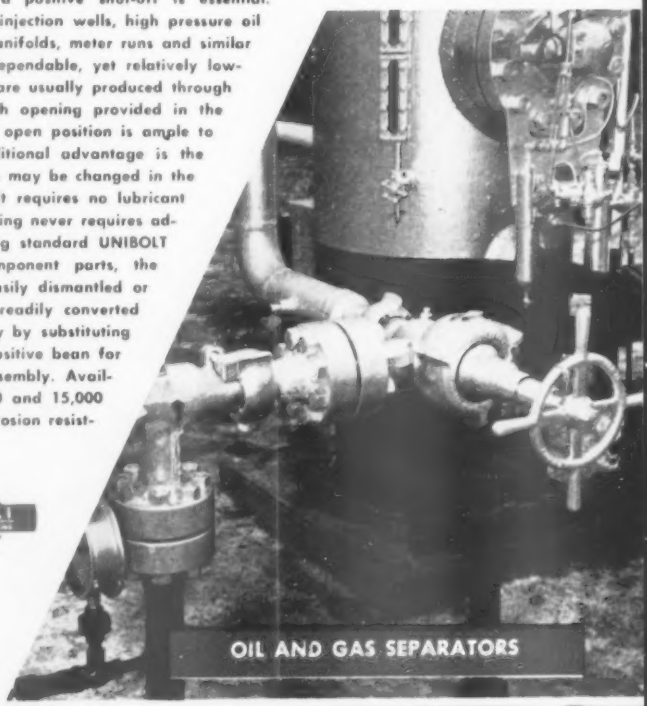
adjustable wing valves are your best bet !



The UNIBOLT Wing Valve, designed originally for use as an adjustable choke where well conditions did not demand a positive choke, has become popular with production men as a dependable valve for numerous services where a positive shut-off is essential. Christmas trees for both producing and injection wells, high pressure oil and gas separator manifolds, heater manifolds, meter runs and similar services are made to order for this dependable, yet relatively low-cost valve. Since high pressure wells are usually produced through a small positive choke, the one-inch opening provided in the UNIBOLT Wing Valve when in full open position is ample to assure unrestricted flow. An additional advantage is the replaceable stem and seat, which may be changed in the field, easily and at low cost. It requires no lubricant to effect a seal. The stem packing never requires adjustment or tightening. Having standard UNIBOLT Couplings between its component parts, the UNIBOLT Wing Valve is easily dismantled or assembled, and may be readily converted to a Positive Choke Body by substituting a blanking plug and positive bean for the stem and seat assembly. Available in 6,000, 10,000 and 15,000 lbs. test, and in corrosion resistant alloy.

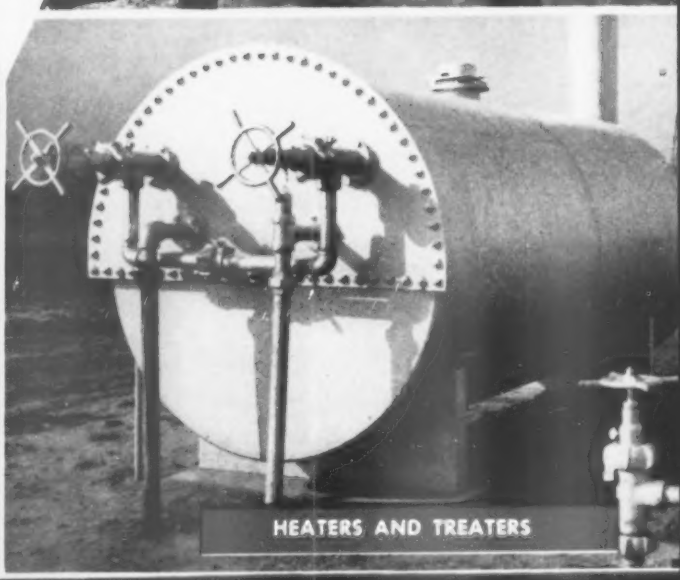


GATHERING MANIFOLDS



OIL AND GAS SEPARATORS

CHRISTMAS TREE FLOW MANIFOLDS



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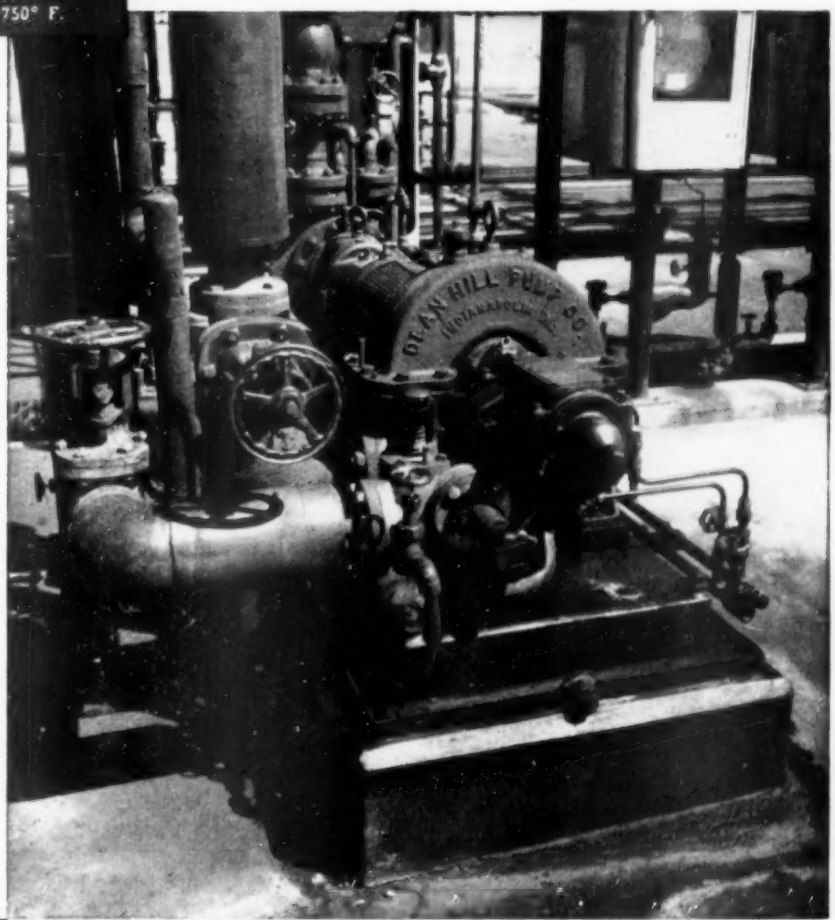
Designed with the operator in mind!

No streamline housings.
No needless cover-ups.
Nothing fancy or frilly about these power-making huskies. Dean Hill Steam Turbines are designed and built for nothing but long service and easy, economical operation. Their heavy, rugged construction is simple and uncluttered for quick, easy maintenance. All pressure parts are outside and visible to operator.

DEAN HILL STEAM TURBINES

.....are single stage, double impact type for low steam consumption. Specifically designed for operation at medium steam pressures and temperatures, DH Turbines have all the advantages available under these conditions, including excellent water rates. Write us for further information and complete specifications.



One of eighty-four Dean Hill Steam Turbines recently installed in a large, eastern Refinery

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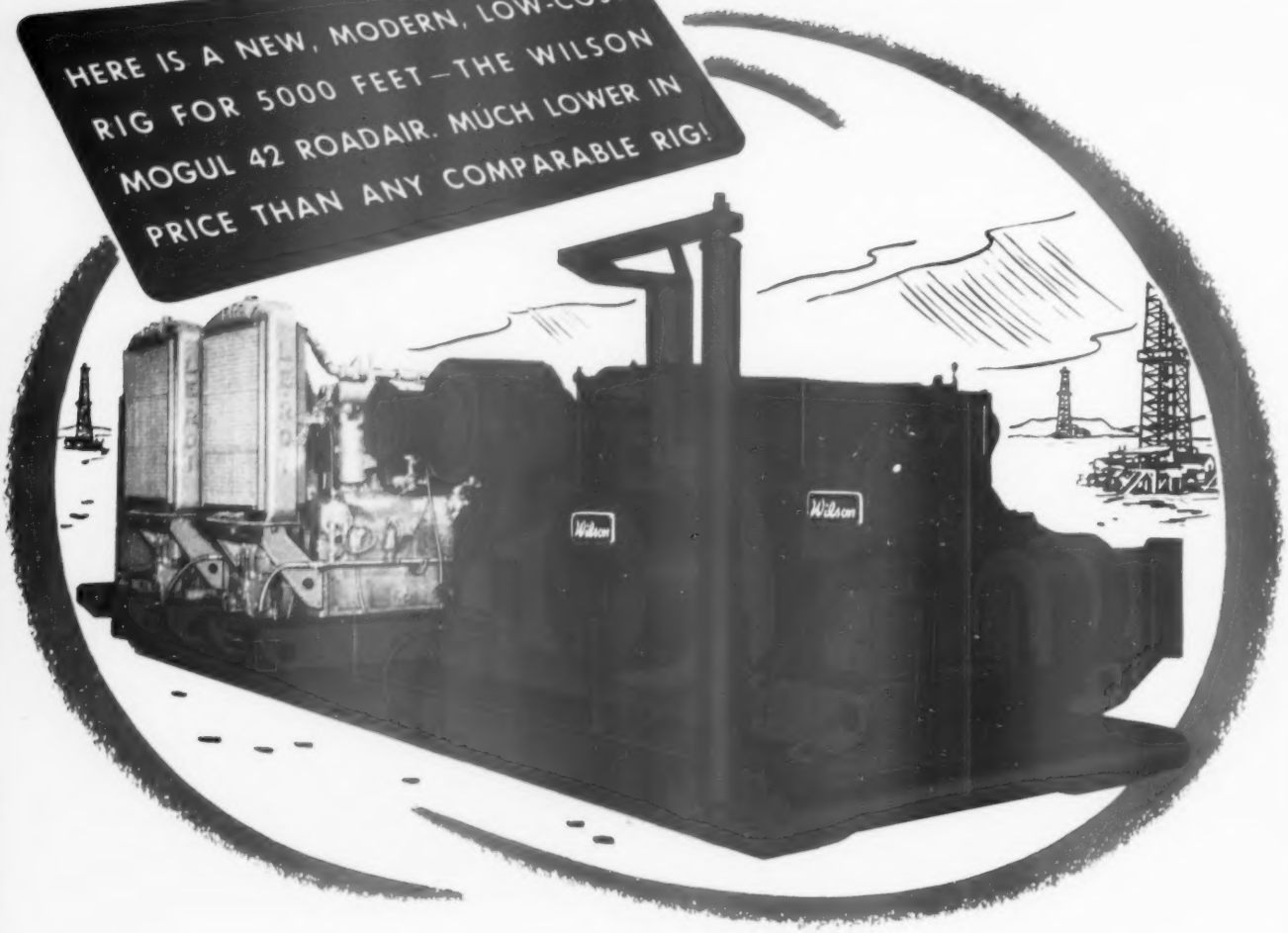
HERE IS A NEW, MODERN, LOW-COST RIG FOR 5000 FEET—THE WILSON MOGUL 42 ROADAIR. MUCH LOWER IN PRICE THAN ANY COMPARABLE RIG!



"after all—the only thing we're talking about is MONEY"

The Mogul Roadair "42" Rig was designed to meet the need of those customers who want a rig *with compounded engines* of up to 400 H.P. total, to drill wells up to 5000 feet with 4½" pipe, without torque converters, and at the lowest total cost. This rig more completely fills all of these requirements than any rig we know. Of the 400 engine horsepower, 300 can be used on the pump and about 100 on the rotary table, and yet all 400 H.P. will be available when coming out of the hole.

The rig also has the safety and dependability inherent in having two engines, with compound, so that either can be used in the event of failure of the other. The V-belt compound is designed to use the high strength steel cord V-belts, which are run at fairly high speed, to carry relatively large H.P. in a narrow width.

It is equipped with a 118 Air-Tube disc engine clutch in a positively aligned clutch housing, which has proved so successful in other Wilson Roadair and Torcair Rigs.

The drum assembly in this rig is exactly like the regular Mogul Torcair "42" rig, which has two friction clutch drum speeds. But in addition it has a two speed jaw clutch transmission in a heavy plate case. The brake rings are "42" diameter, and brakes are 8" wide, full wrap type and cam and roller operated.

This is a fast, dependable rig, at the lowest possible cost, that will make possible *lower drilling costs than any other rig of comparable size!*

Compare Features... Quality... Prices

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MANUFACTURING CO., Inc.

WICHITA FALLS, TEXAS

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POWER HOUSE

The heart of Philco Microwave is this "Power House" klystron . . . with it Philco has the highest equipment power output in the 6000-7500 mc band . . . generating a full watt of output power it provides Philco Microwave systems with a reliability safety margin of 30 decibels (1000 to 1) . . . greater assurance of performance under any and all field conditions.

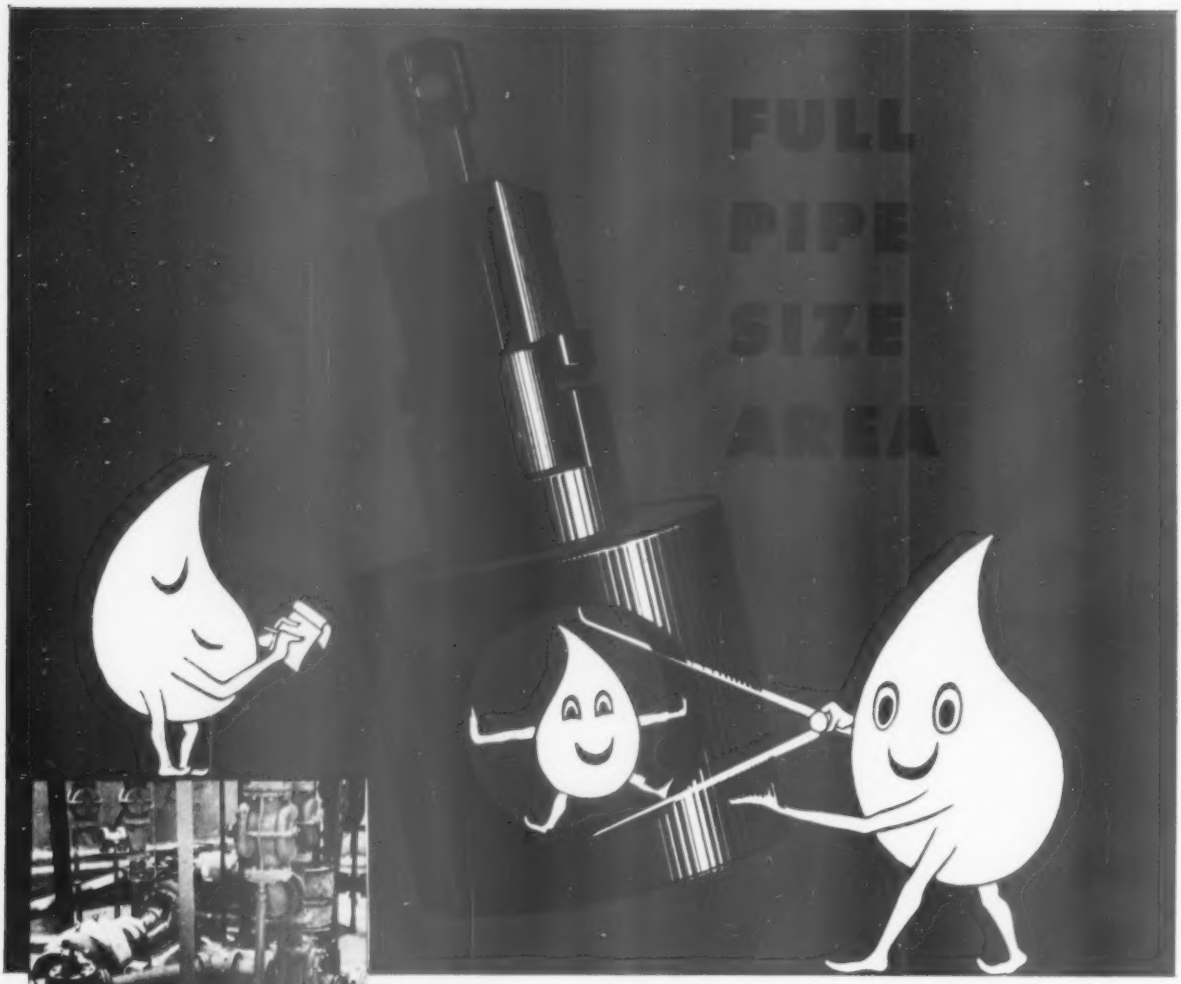
Philco's exclusive feedback design makes possible full use of this powerful klystron . . . requires the use of only two of these klystrons for simultaneous two-way transmission and reception . . . minimizes cumulative distortion and noise with numerous repeater stations. In combination with other Philco features such as custom-sized, high gain, antenna-reflector systems and operation in the preferred and interference free frequency band, the result is reliable, high quality communications.

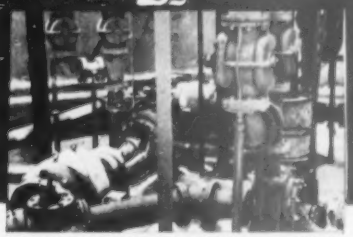
Look to Philco Microwave for the answer to your communications requirements.

For Complete Information Write to Department OG

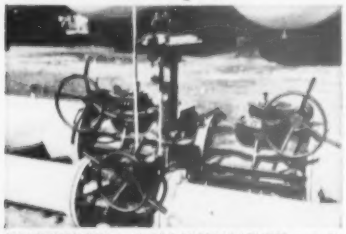
PHILCO CORPORATION

GOVERNMENT & INDUSTRIAL DIVISION · PHILADELPHIA 44, PA.

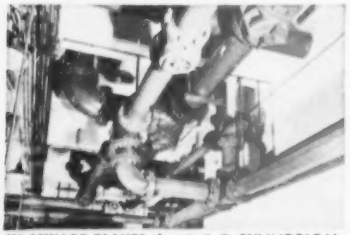




IN THE CHEMICAL and INDUSTRIAL PROCESSING FIELD a.c.f. Round Port CYLINDRICAL Plug Valves handle abrasive ladings, such as cement slurry, coal wash water, etc., without erosion—and have long life.



IN PETROLEUM and GAS INSTALLATIONS a.c.f. Valves give full-area flow with fast, positive shut-off.



IN SEWAGE PLANTS the a.c.f. CYLINDRICAL Plug shears obstructions on raw sewage lines . . . provides uninterrupted flow.

a.c.f.'s Full Round Port, CYLINDRICAL Plug Valve has a straight level-through flow passage the same size and shape as the pipe itself! This means fast unobstructed flow of heavy or viscous ladings, solids in suspension, all liquids and gases.

And—there is full straight-through pipe area in a.c.f.'s Rectangular Port, CYLINDRICAL Plug Valve, too.

Investigate—you need "full pipe size area" valves for economical processing.

a.c.f. CYLINDRICAL FULL PIPE AREA PLUG VALVES

Write for Catalog 4-OG, American Car and Foundry Co., Valve Division, 1502 E. Ferry Ave., Detroit 11, Michigan

Representatives in 50 Principal Cities

The strongest rack bar makes the toughest jack

the Roustabout "1523"

A ratchet jack like the Duff-Norton all-purpose Roustabout "1523" is no stronger than its rack bar, the notched steel "heart" that moves up and down holding the load. The rack bar on this 15-ton capacity oil field jack is stronger and tougher than the rack bar on any other ratchet jack of this type. It's *stronger* because it's *larger!*

Next time you see a Duff-Norton ratchet jack, examine the rack bar; you'll notice it's oblong like this: ▬ . Then look at the rack bar on any other make ratchet jack. It's smaller, square like this: ■.

So you get the most and best for your money with a Duff-Norton Jack.

Ask your supply store salesman for the Duff-Norton Roustabout "1523." He has it in stock or can get it for you quickly. For complete specifications on this and other dependable Duff-Norton jacks, write the world's oldest and largest manufacturer of lifting jacks for special Oil Field Jack Bulletin, AD19-B, the Duff-Norton Manufacturing Co., P.O. Box 1889, Pittsburgh 30, Pa. Canadian plant—Toronto 6, Ontario.

"Giving Industry A Lift Since 1883"

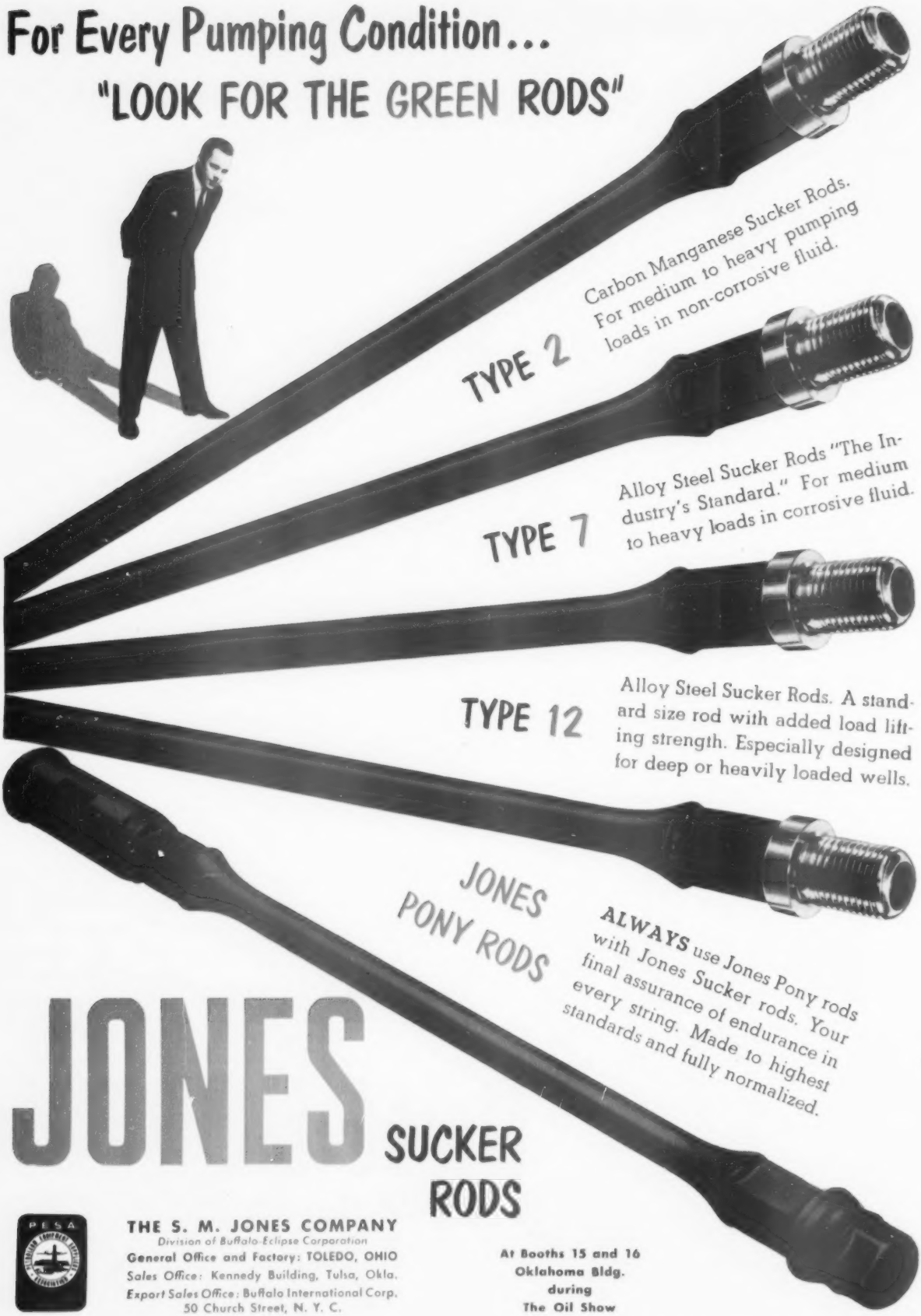
DUFF-NORTON

Jacks

Visit us at The Oil Show, BOOTH 154, Oklahoma Building

For Every Pumping Condition...

"LOOK FOR THE GREEN RODS"



TYPE 2 Carbon Manganese Sucker Rods. For medium to heavy pumping loads in non-corrosive fluid.

TYPE 7 Alloy Steel Sucker Rods "The Industry's Standard." For medium to heavy loads in corrosive fluid.

TYPE 12 Alloy Steel Sucker Rods. A standard size rod with added load lifting strength. Especially designed for deep or heavily loaded wells.

JONES PONY RODS **ALWAYS** use Jones Pony rods with Jones Sucker rods. Your final assurance of endurance in every string. Made to highest standards and fully normalized.

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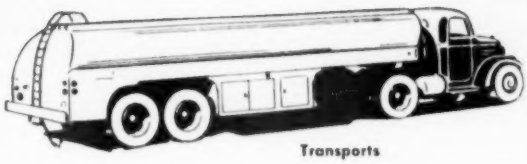
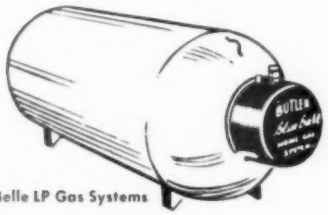
in Tulsa as always . . . .



Transports

Steel Buildings

Truck Tanks



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Visit the Butler Exhibit at the International Petroleum Exposition & Congress May 14-23 Tulsa, Oklahoma

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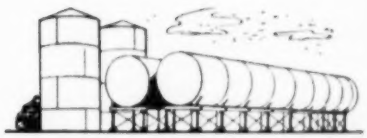
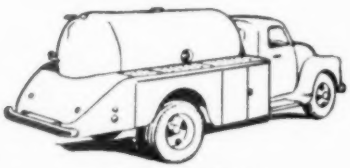
1232 East 25th Street, Tulsa
Tulsa Phone: 72-2745

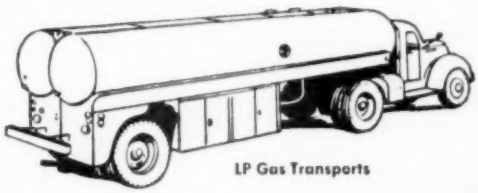


Welded Steel Tanks



LP Gas Truck Tanks

Bolted Steel Tanks



LP Gas Transports

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MANUFACTURING COMPANY

WHEN IT'S LIQUID LEVEL CONTROL

...it's FISHER®

FISHER®

LEVEL-TROL

...the Accepted Standard

for a liquid level controller that is high in sensitivity and accuracy, versatile in handling all kinds of liquids, ruggedly built, easy to operate and simple to maintain.

Write for Bulletin F-3

FISHER®

FISHER GOVERNOR COMPANY · Marshalltown, Iowa

WORLD LEADER IN RESEARCH FOR BETTER PRESSURE AND LIQUID LEVEL CONTROL

PROOF AGAIN—
at the Big Tulsa Show
DIAMOND ROLLER CHAINS

Shot-Peening Since 1944

To increase the fatigue resistance of Diamond Chains, link plates have been specially processed, and chain rollers and other parts have been shot-peened since 1944.

Patented BCL Connector

The patented, bushed-centered-plate BCL connector for multiple-strand press-fit center-plate chain has simplified connecting and disconnecting, and assures full value in Diamond Chains at the connecting links.

Press-Fit Center-Plate Construction of Multiple-Strand Roller Chain

Diamond's press-fit center-plate construction of multiple-strand chains provides equal distribution of loading across the chain width—throughout the entire, longer service life.

Rigidity of Link Construction

Special finishing of link plate pitch holes, providing 100% contact of pins and bushings in their respective link plates, considerably enhances the uniform and substantial press-fitting of these parts, assuring maximum rigidity of link construction.

ON THE COUNTRY'S FOREMOST OIL FIELD EQUIPMENT

DRILLING • PUMPING • SERVICING RIGS

• The greatest number ever to attend an International Petroleum Exposition again saw proof of the wide preference for Diamond Roller Chains. On dozens and dozens of America's finest modern rigs made by the recognized top-flight manufacturers of oil country machinery, the Roller Chains used were identified by the well-known "Diamond" mark . . . For over 30 years of application in oil fields all over the globe, these Chains have proven their stamina, uniform high quality, and long-life dependability.

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Where High Quality is Traditional
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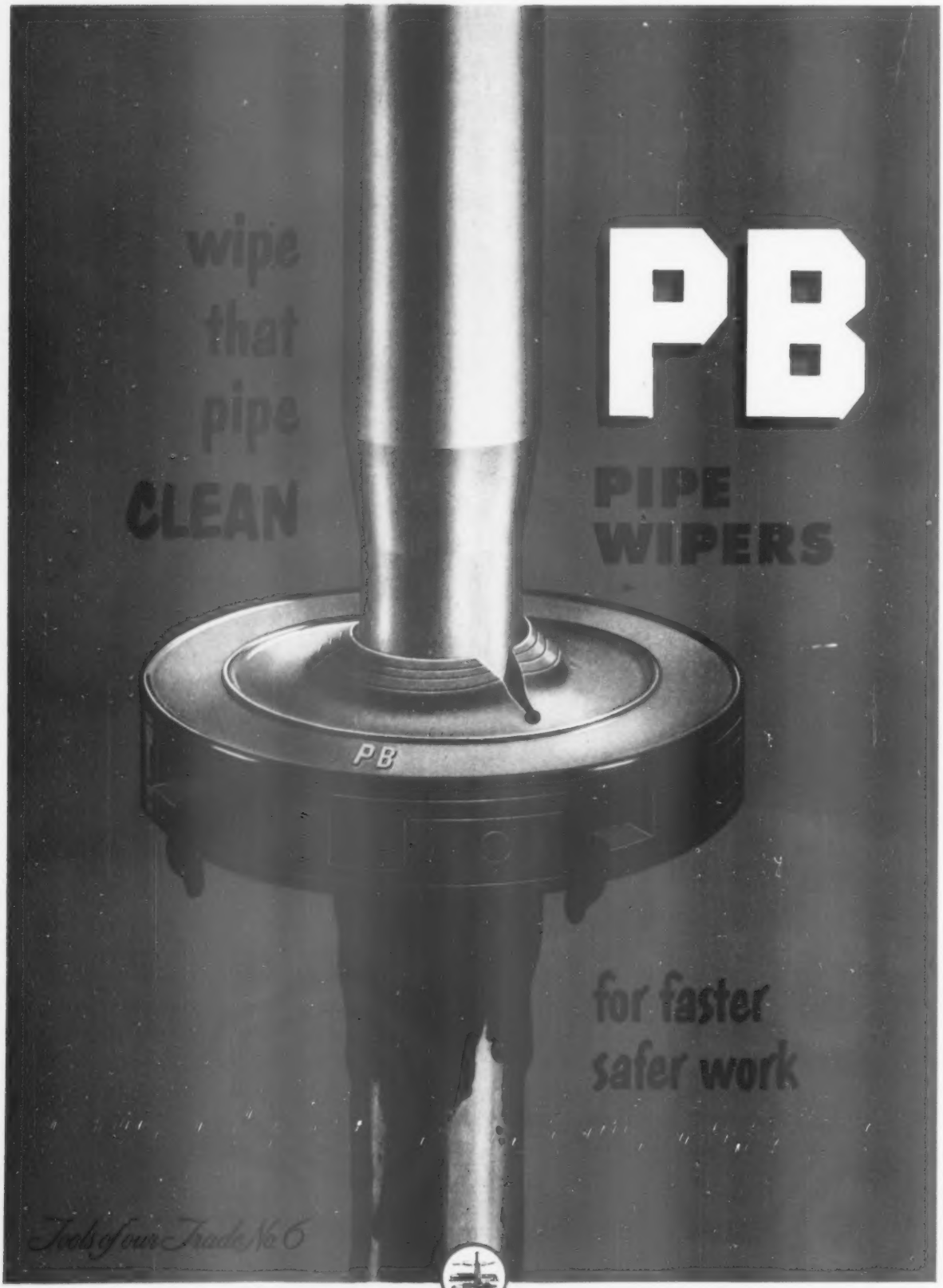
Offices and Distributors in All Principal Cities
Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND ROLLER CHAINS



PB OIL FIELD RUBBER SPECIALTIES

BJ PB

Byron Jackson Co. Since 1872

LOS ANGELES NEW YORK FORT WORTH HOUSTON

BJ MEANS ENGINEERED OIL TOOLS

BJ PB

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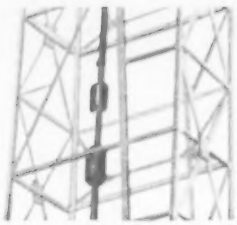


Runs Like New

after 8,000 hours!

HERE's proof based on certified factory tests that Allison TORQMATIC Converters run like new—long after they go to work:

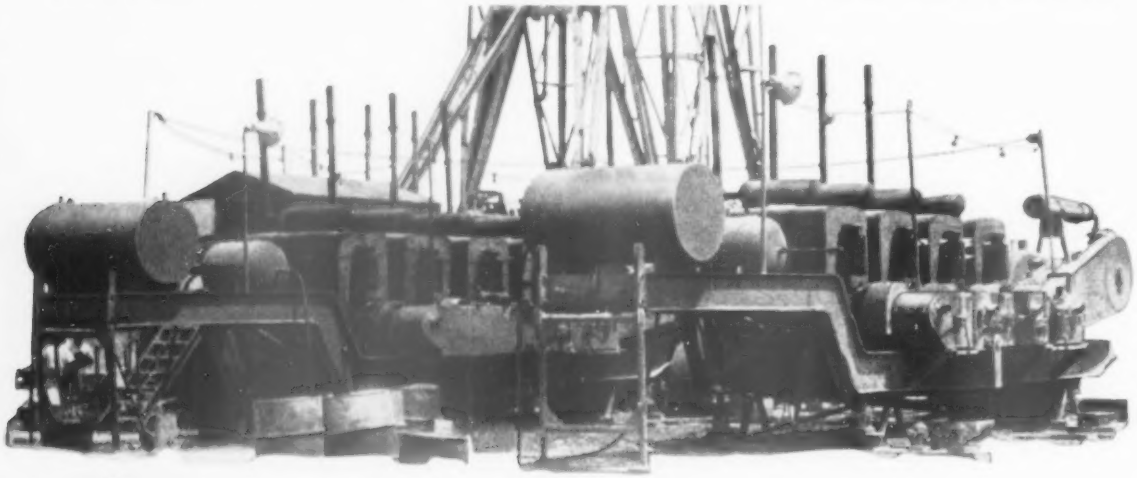
An international oil company had an Allison TORQMATIC Converter transmitting engine power for a mud pump at Lake Maracaibo. After 8,000 hours of operation, the converter was brought back to Allison for a performance check. *Tests proved that there was no variation from original power curves—absolutely no drop in efficiency.*

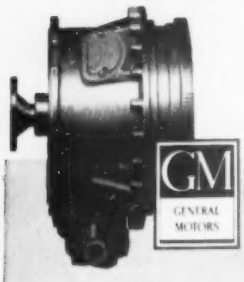
This firm now has 48 Allison TORQMATIC Converters and many more on order. Like-new performance after almost a year's continuous operation offers convincing proof that Allison TORQMATIC Converters are the best power-transmitting buy.

Allison Converters hold engine power to the load and act as a fluid coupling when load requirements equal engine torque. Handling from 75 to 400 horsepower, the converter protects both engines and driven equipment by absorbing shock loads and vibration.

If you are not familiar with all the advantages of Allison Converters, get the full story from your engine manufacturer, dealer or write:

ALLISON *Division of* GENERAL MOTORS
Box 894HH, Indianapolis 6, Indiana



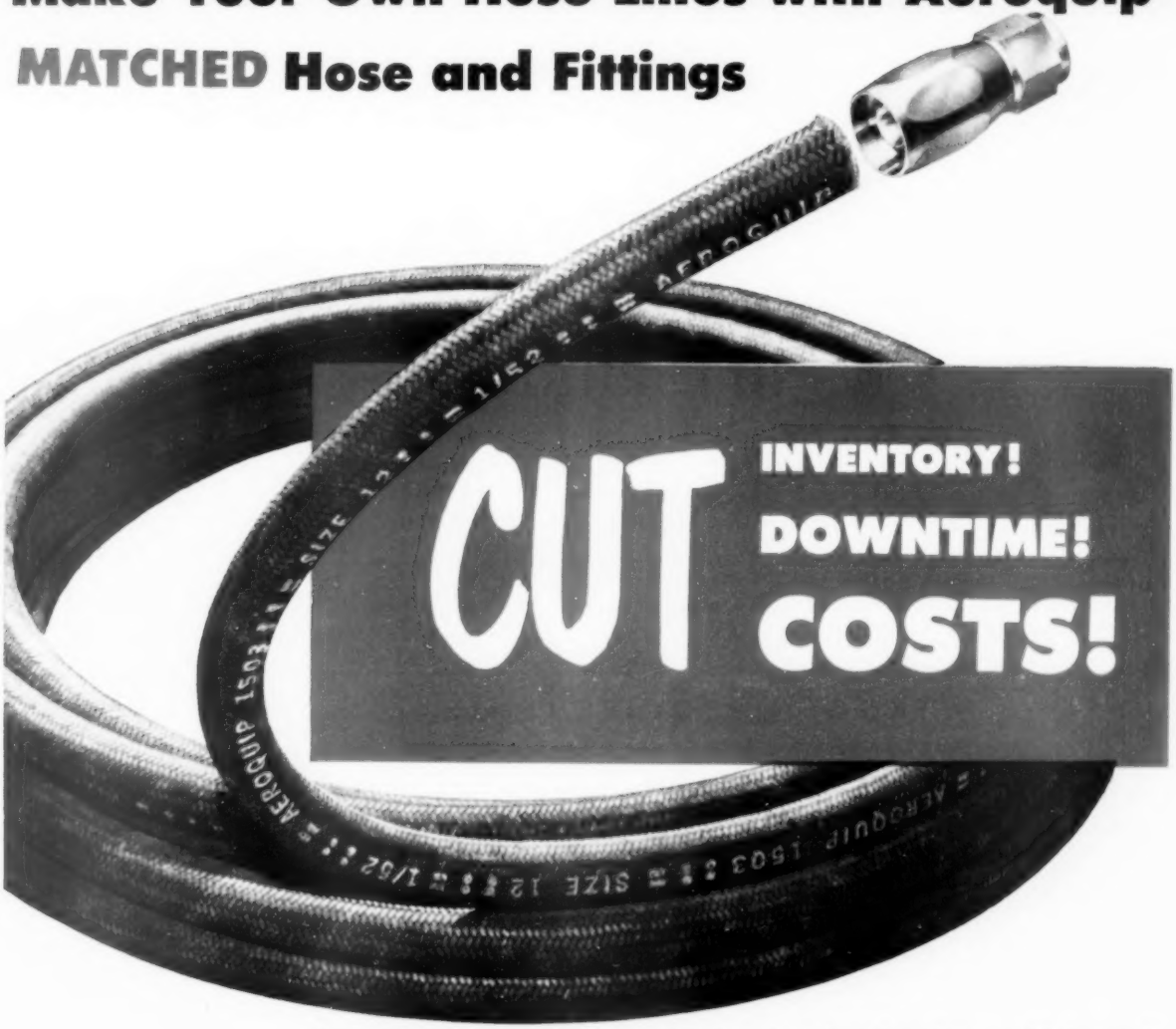


Allison **TORQMATIC DRIVES**

COMPACT, EFFICIENT HYDRAULIC DRIVES FOR CRANES * TRACTORS * TRUCKS * SHOVELS * DRILLING RIGS * SCRAPERS

Make Your Own Hose Lines with Aeroquip

MATCHED Hose and Fittings



Aeroquip Fittings are designed, developed, and produced to go with Aeroquip Hose. They form such a foolproof combination that Aeroquip *guarantees* performance. Thus, the hose lines made right in your own plant always measure up to Aeroquip's exacting standards of quality, the highest in the industry. A small supply of Aeroquip Bulk Hose and Fittings assures you of quick hose line replacements at all times . . . and Aeroquip Fittings are detachable and may be used again and again when making new hose assemblies.

Aeroquip

REG. TRADE MARK

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SALES OFFICES: BURBANK, CALIF. • DAYTON, OHIO • HAGERSTOWN, MD. • HIGH POINT, N. C. • MIAMI SPRINGS, FLA. MINNEAPOLIS, MINN. • PORTLAND, ORE. • WICHITA, KAN. • TORONTO, CANADA

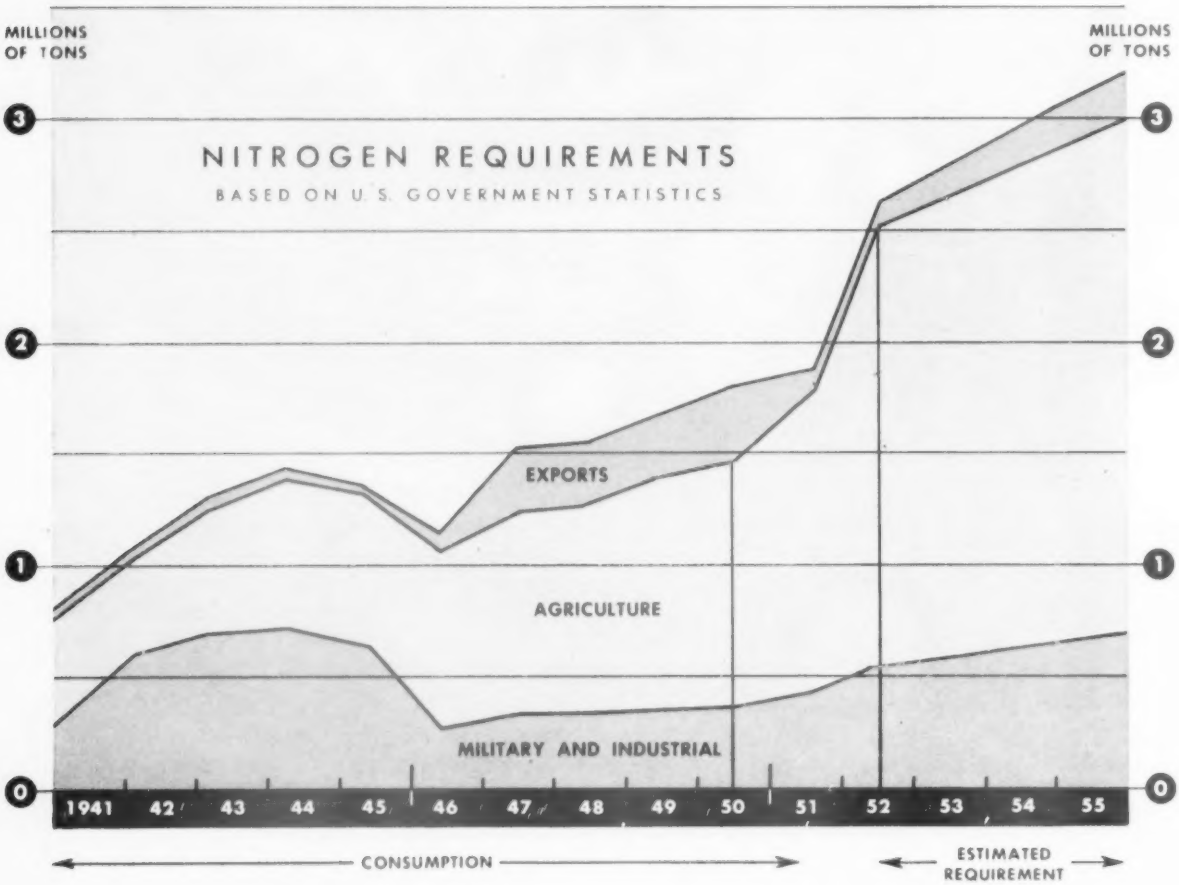
AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

ARE YOU KEEPING STEP WITH THE *rapidly expanding* FERTILIZER MARKET?

If you are contemplating entering the fertilizer business or expanding your present facilities, you will do well to have Chemico handle your plant design and construction problems.

Regardless of whether your product will be urea, some other nitrogenous fertilizer or phosphate, we will handle your project on a one-contract, one-responsibility, performance-guaranteed basis.

The experience we have gained from more than 900 heavy chemical installations throughout the world is assurance of successful completion and efficient operation of your plant.



CHEMICAL CONSTRUCTION CORPORATION

A UNIT OF AMERICAN CYANAMID COMPANY

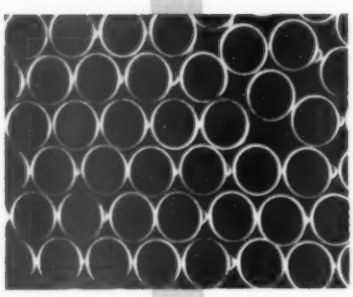
488 MADISON AVENUE, NEW YORK 22, N. Y.

CABLES: CHEMICONST, NEW YORK

TECHNICAL REPRESENTATIVES: CYANAMID PRODUCTS LTD., LONDON * CHEMICAL CONSTRUCTION (INTER-AMERICAN) LTD., TORONTO * SOUTH AFRICAN CYANAMID (PTY) LTD., JOHANNESBURG

Chemico plants are profitable investments

What Proves the Worth of a Boiler Tube?



Claims of dependability . . . of consistently uniform wall thickness, diameter, and physical properties . . . of freedom from scale, slivers, pitting, and other defects inside and outside a tube, are common—*and true*—for all quality boiler tubes regardless of the mill that supplies them. They are true because *all boiler tubes must conform to the same specifications for the same jobs.* Side-by-side they're "look-alikes," yet there is a difference . . . a difference that only *time* can prove under the grueling conditions of heat, pressure, corrosion, and oxidation found inside a modern boiler. B&W boiler tubes have met this test of time in boilers serving the widest variety of applications . . . utilities, industries, government institutions, hospitals, office buildings, apartment houses . . . wherever fine boilers are operating efficiently over extended periods.

Say B&W before you say WELDED BOILER TUBES—for Service-Proved Dependability.
For three-quarters of a century, B&W has been directly concerned with developing and applying boiler tubes for lowest pressures up to those approaching 3000 psi. The application of this extensive knowledge and experience results naturally in the production of finer boiler tubes.

B&W dependability is proved by time and endorsed by hundreds of customers who keep coming back for more . . .

B&W WELDED BOILER TUBES.

B&W SEAMLESS and WELDED TUBES

THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION
Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing
Alliance, Ohio—Welded Carbon Steel Tubing

TA-1742 (A)

This "Working Heart" assures long life for your LUNKENHEIMER VALVES

Handwheel, stem, and disc . . . these parts are the "working heart" that affects the life of every valve. Lunkenheimer valves are famous for the long, economical service these vital parts give. Take this 200 lb. S.P. "Renewo" Valve, for example:

HANDWHEEL is the new cool-operating "Non-Slip" design that eliminates leakage by enabling the operator to close the valve *tight* with ordinary hand pressure. Four rounded lugs provide a firm grip even when the operator's hands are wet and greasy.

STEM is made of famous "Stemalloy"*, which eliminates stem-thread failure. Amazing exclusive silicon-bronze alloy has exceptional wearing qualities. Millions are in use, and not one has ever been returned due to wear failure.

DISC AND SEAT — 500 BRINELL STAINLESS STEEL — for long, trouble-free service where erosive and corrosive conditions are present. Disc and seat are renewable and can be easily replaced with fullway type seat and disc.

Write for Circular 577, a new bulletin which gives you complete information on the "Renewo" line. And for the finest service on valves, see your Lunkenheimer distributor. The Lunkenheimer Company, Box 360F, Cincinnati 14, Ohio.

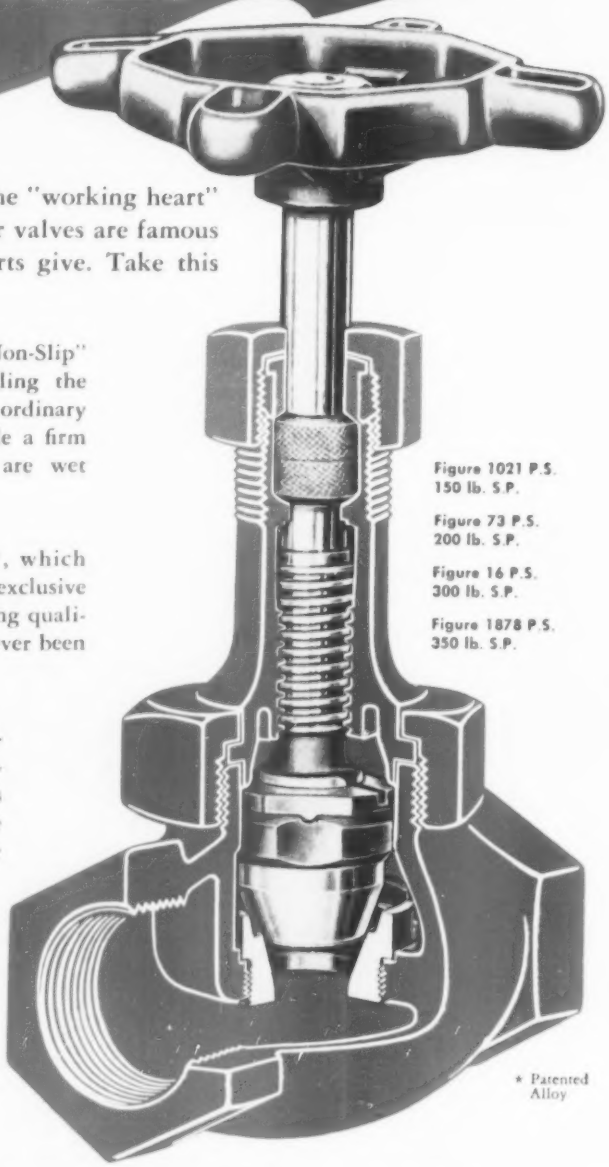


Figure 1021 P.S. 150 lb. S.P.

Figure 73 P.S. 200 lb. S.P.

Figure 16 P.S. 300 lb. S.P.

Figure 1878 P.S. 350 lb. S.P.

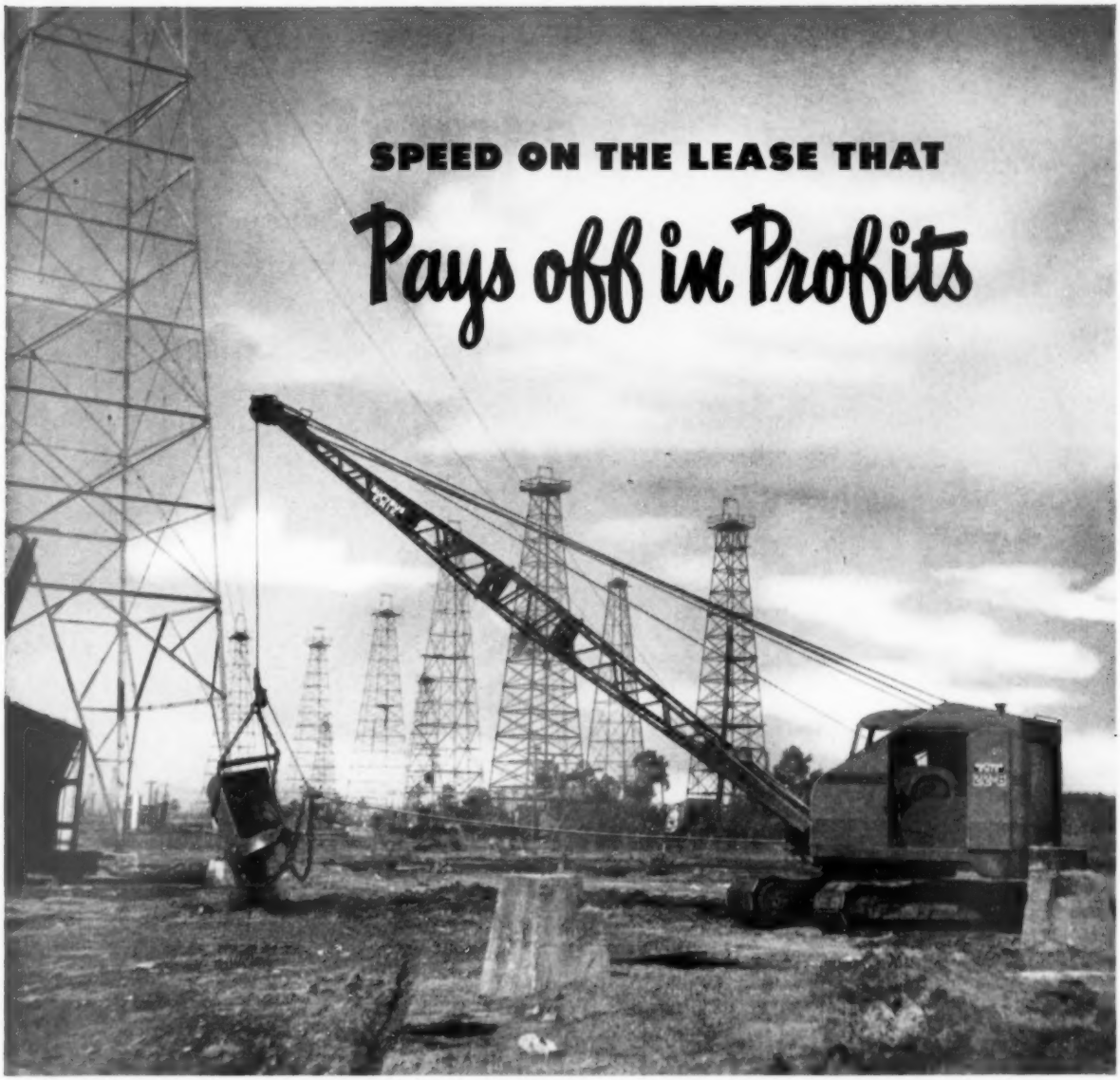
* Patented Alloy

BRONZE • IRON • STEEL

LUNKENHEIMER

THE ONE *Great* NAME IN VALVES

L-653-13



Like all oil field drilling operations, putting down wells on this lease in Texas meant moving plenty of dirt — fast. No wonder Mallard & Mallard of Hardin, Texas — specialists in building access roads, digging mud reservoirs and leveling leases — chose a Bucyrus-Erie 22-B dragline for this kind of work.

The 22-B's smooth, fast swing — with the operator in perfect control of acceleration and deceleration — is carefully timed with hoist speeds into an exceptionally fast cycle. And, compact design and proper weight distribution provide the stability needed for high speed dragline operation.

Bucyrus-Erie draglines are readily converted in the field to shovel, crane, dragshovel or clamshell front end for handling all your oil field excavating and materials handling work. Get complete information by writing us — or ask your nearest Bucyrus-Erie shovel distributor for all the facts.

32E53

BUCYRUS ERIE **BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WISCONSIN**

AHEAD OF THE TANK CARS

First there's
financing by the
FIRST in Dallas

The Southwest's Pioneer Oil Bank

FIRST NATIONAL
BANK IN DALLAS

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Give us an opportunity to say YES

Remember the trade marks "tt" and "TUBE-TURN" are applicable only to products of TUBE TURNS, INC.

Engineered for tough service

THIS TUBE-TURN Welding Neck Flange will contain greater pressures under temperature extremes, and will last longer than other types under repeated bending or vibrations of piping. It is *engineered* for tough service . . . with a long, tapered hub, and a smooth transition in thickness to the pipe-end bevel.

You can select the exact Welding Flanges you require from TUBE TURN's complete line: welding neck; slip-on; lap joint; socket welding; blind; orifice; or pipeline non-standard flanges. It *pays to specify* TUBE-TURN Welding Fittings and Flanges. Call your nearby TUBE TURNS' Distributor . . . you'll find one in every principal city.

Be sure you see the double "tt"

TUBE TURNS, INC. LOUISVILLE 1, KENTUCKY

DISTRICT OFFICES: New York · Philadelphia · Pittsburgh · Chicago · Houston · Tulsa · San Francisco · Los Angeles · Denver · Atlanta

Subsidiaries: TUBE TURNS OF CANADA LIMITED, CHATHAM, ONTARIO • PENNSYLVANIA FORGE CORPORATION, PHILADELPHIA, PA.

ENGINEERING SERVICE

TUBE TURNS' *Engineering Service* HELPS DEVELOP NEW PIPING TECHNIQUE

D. R. Cheyney, of TUBE TURNS' Engineering Service Division, has had wide experience in alloy and non-ferrous applications.

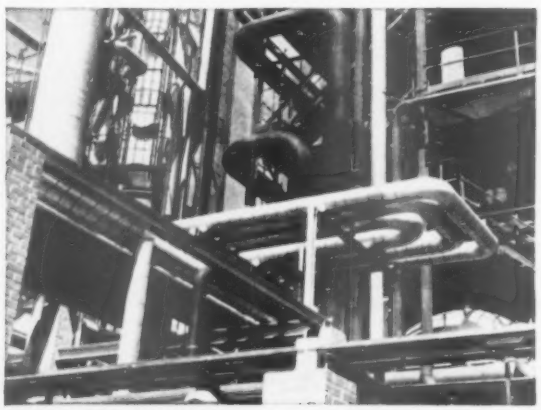
THIS STORY of how a large processor saved $50,000 and conserved scarce copper with a new approach to a piping application shows why TUBE TURNS, INC. is so highly regarded as an authority on piping engineering.

The problem involved the retubing of seven cooling units, formerly fabricated from copper tubing and fittings. Aluminum was considered as a replacement; however, there were no satisfactory methods for welding thin-walled aluminum tubing to welding fittings. TUBE TURNS' Engineering Service Division, working with Alcoa, came up with the solution. A new brazing technique was developed, and special TUBE-TURN Welding Returns, and TUBE-TURN Welding Elbows were supplied.

TUBE TURNS' Engineering Service is ready to help *you* in such special applications.

TUBE-TURN aluminum long-radius Welding Returns being brazed to aluminum tubing, in fabrication of cooling coils.

SPEEDS FABRICATION—TUBE-TURN Welding Fittings have won a reputation for dimensional accuracy that pays off in fast, easy alignment and fabrication. Time often is saved by welding assemblies in the shop, quickly tying them into the job.



SAFE AND SURE—Forged-in strength of TUBE-TURN Welding Fittings makes process piping uniformly strong throughout, assures safe, leakproof joints.

Want Dimension Data?

TUBE TURNS, Inc. has compiled a handy folder of charts covering dimensions and weights of TUBE-TURN Welding Fittings and Flanges. If you'd like a free copy just send this coupon.

TUBE TURNS, INC., Dept. J-5
224 East Broadway, Louisville 1, Kentucky

Your name .....

Position .....

Company .....

Nature of Business .....

Address .....

City ..... *State* .....

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Chicago	Los Angeles
Atlanta	Denver

"tt" and "TUBE-TURN" Reg. U. S. Pat. Off.

TUBE TURNS, INC.

LOUISVILLE 1, KENTUCKY

You could know the plant . . . 20 years of steady growth . . . 20 years of work, brains and money . . . then in 20 minutes a little fire got away and reduced it all to nothing.

But, your larger size fire hazards can be protected very efficiently at a reasonable cost, thanks to C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing Systems. Simple piping, running from one centrally located storage tank, instantly transports clean, non-damaging, non-conducting carbon dioxide anywhere in the plant area . . . to flammable liquids, electrical equipment, storage spaces, manufacturing processes and record vaults. Fire at any protected location is extinguished in seconds with an absolute minimum of expense and interruption.

Flexibility is the keynote with these C-O-TWO Fire Extinguishing Systems . . . the low pressure carbon dioxide storage tanks range in capacities from one to fifty tons . . . discharge facilities can either be manual mechanical, manual electric, automatic mechanical, automatic electric or a combination of these . . . especially installed to fit your particular needs. Future plant expansion is easily and economically provided for by initially installing an oversized low pressure carbon dioxide storage tank and adding the supplementary discharge facilities at a later date.

Whether it's fire detecting or fire extinguishing . . . portables or built-in systems . . . C-O-TWO means experienced engineering that assures you of the best type equipment for the particular fire hazard concerned.

WHEN BUSINESS STOPS . . . INCOME STOPS!

Don't take chances with your investment. Secure the benefits of highly efficient fire protection engineering today . . . our extensive experience over the years is at your disposal without obligation. Get the facts now!

C-O-TWO

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

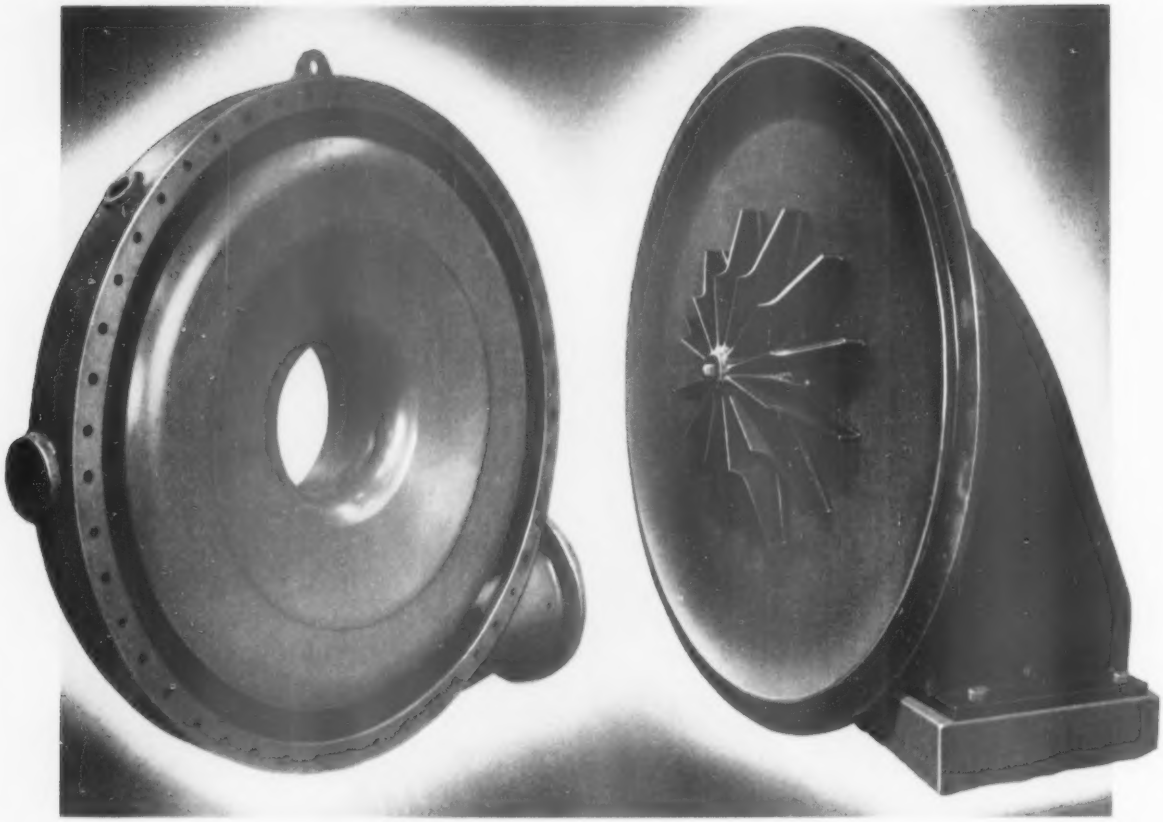
Squeez-Grip Carbon Dioxide Type Fire Extinguishers
Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

C-O-TWO FIRE EQUIPMENT COMPANY
NEWARK 1 • NEW JERSEY

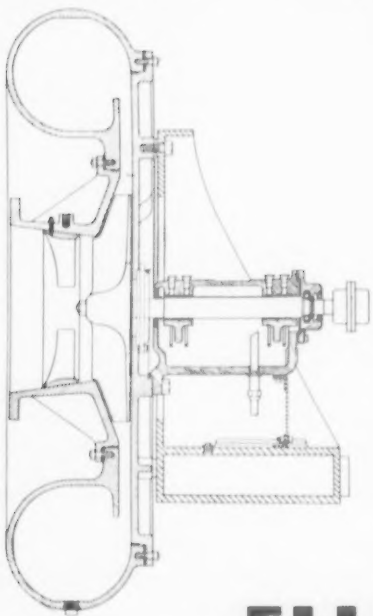
C-O-TWO FIRE EQUIPMENT OF CANADA, LTD. • TORONTO 8 • ONTARIO

Sales and Service in the Principal Cities of United States and Canada

AFFILIATED WITH PYRENE MANUFACTURING COMPANY



Simplicity IS THEIR STRONG POINT



Elliott centrifugal blowers have surprisingly few parts for the work they do. The single-stage blower illustrated has a one-piece cast impeller, with no sharp corners or crevices to hold foreign matter which might cause unbalance or reduce efficiency. The major stationary parts are the casing, inlet connection, backplate and base assembly, and bearing housing. All are heavy construction with sufficient rigidity to keep vibration to an absolute minimum. Objectionable noise is kept at a low level by inlet guide vanes which pre-rotate the air or gas before it enters the impeller.

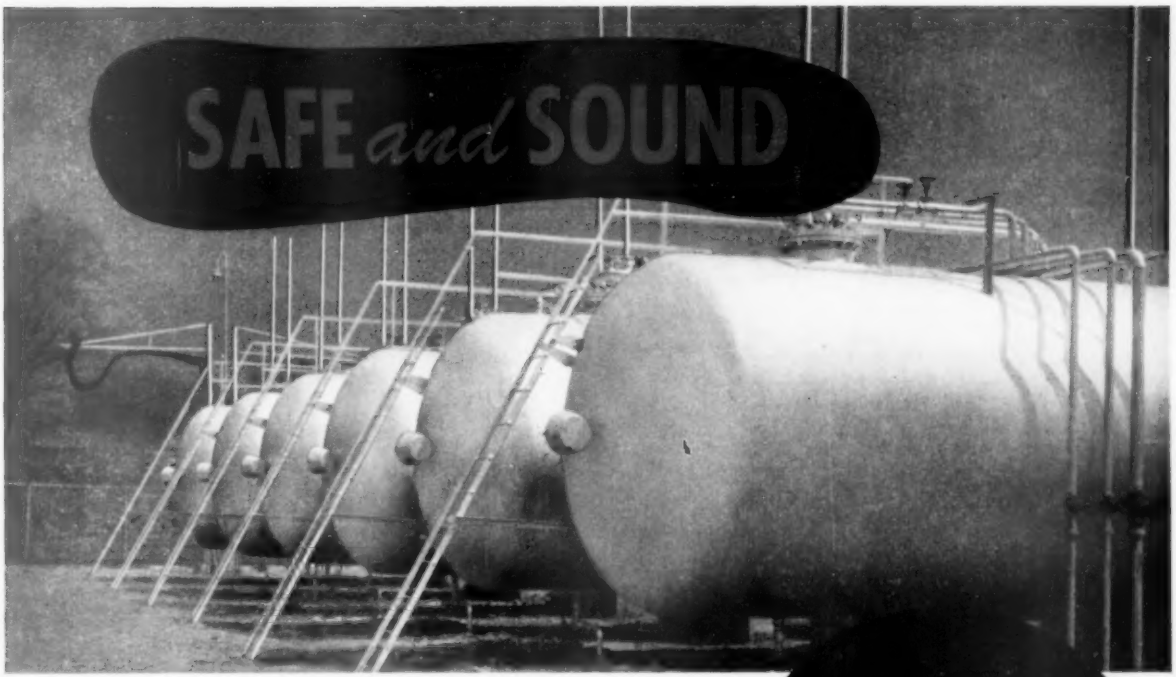
In addition to single-stage blowers of the type illustrated, Elliott also builds a complete line of multi-stage blowers. Drive can be electric motor or steam turbine, both Elliott-built. Where corrosive elements are encountered, essential parts can be made of suitable alloy materials.

For full details, consult your local Elliott representative or write Elliott Company, Jeannette, Pa.

ELLIOTT Company

CENTRIFUGAL BLOWER DIVISION

P3-2



Here's what the Posey Iron Works offers to assure oil men of safety and soundness in pressure tanks:

1. A practical, workaday knowledge of peak loads . . . pressure . . . reserve capacities . . . fire protection requirements . . . steels . . . alloys . . . and specialized construction as they relate to the oil field.

2. Advanced inspection techniques that reveal flaws *prior* to shipment. These techniques include x-ray . . . hydrostatic . . . and hammer tests. Tanks are tested to a considerable excess over working pressures.

3. In welding Posey Iron tanks, only modern equipment and qualified welders are used. Edges of plates are always properly prepared. That's why tests unvaryingly show a high degree of joint efficiency in vessels built by Posey Iron.

4. Posey Iron construction fully meets the ASME code for unfired pressure vessels. Products are designed and built to comply with the requirements of the ASME; API-ASME; API and other codes. The Posey Iron Works is authorized to apply the appropriate code symbols.

"Play safe" — ask Posey to bid on your pressure vessels.

Alloy steel pipe fabricated by the Posey Iron Works for refinery use.

Fractionating column (awaiting shipment) for high octane aviation gasoline — 3' I.D. x 133' high.

POSEY IRON WORKS, INC.

Steel Plate Division

LANCASTER, PA.

New York Office: Graybar Building

ESTABLISHED SINCE 1910

DIVISIONS
Brick Machinery
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Steel Plate

RIGHT AT THE BEGINNING—

Plan on using Bitumastic® Enamel to protect your pipe line against corrosion

ANY pipe line, whether large or small, is an important investment — an investment that should be properly protected.

That's why it's wise, when planning a new pipe line, to include Bitumastic Enamel in your designs, plans and specifications. Bitumastic Enamels, manufactured from selected coal-tars have proved they can prevent corrosion. Many oil and gas pipe lines, that were coated with Bitumastic Enamel and laid 20 and 30 years ago, are still giving good service today.

Why not let your Koppers representative work with you from right at the beginning through final operations? He will be glad to assist you in getting the most out of your protection dollar. Write for full information.

KOPPERS BITUMASTIC® ENAMELS

KOPPERS COMPANY, INC., Tar Products Division, Dept. 503-T, Pittsburgh 19, Pennsylvania

DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

put this WASTE-HEAT SAVER in your plant

Are you now cooling hot gas oil, cracking coil tar, hot gases or other hot fluids with water?

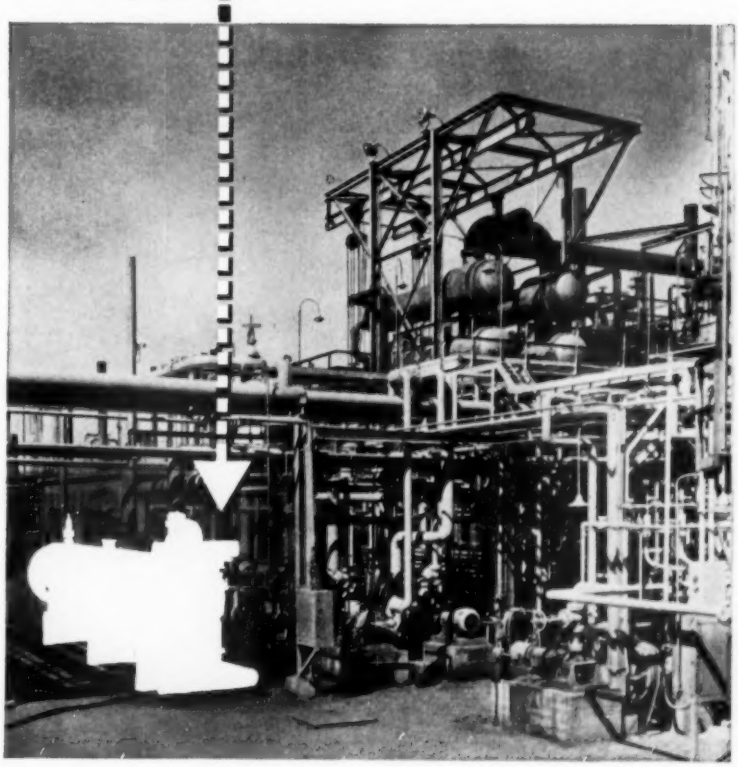
If so, investigate the G-R Waste Heat Steam Generator.

This unit uses waste heat to generate steam at boiler pressure from raw, untreated water. By doing so, it will reduce your process costs . . . your pumping costs . . . your cooling system load . . . and your boiler house steam demand.

The value of the steam produced by a G-R Steam Generator in the first year of service is usually sufficient to pay for the unit.

Various types are available to meet individual plant conditions and requirements, and special designs are available to reduce fouling of the tubes and scale accumulation.

Write for complete information on these heat-saving units that may effect important economies in your plant.

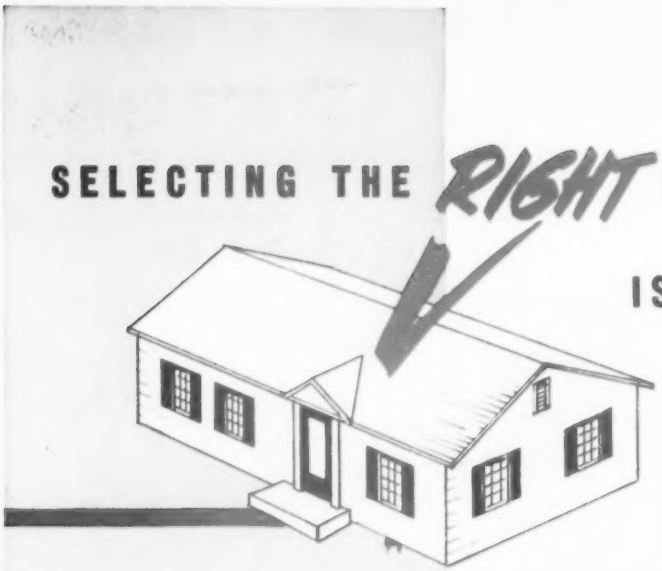


THE GRISCOM-RUSSELL CO., MASSILLON, OHIO

G-R HEAT TRANSFER APPARATUS *Steam Generator*

GR 269

SELECTING THE *RIGHT* FIELD HOUSING IS *IMPORTANT...*



It's good employee relations to see that oil field workers have comfortable homes. It is good business to select field housing that has proved right for the oil industry for almost 35 years.

STURDYBILT Prefabricated Houses are *right* for the oil fields because they are economical, easy to erect, can be moved from one site to another, and are handsome and comfortable enough to suit the most particular oil field family.

Get the RIGHT field housing. Order STURDYBILT Prefabricated Houses.

■ WRITE FOR INFORMATION

MANUFACTURERS OF SPECIAL MILLWORK: DISTRIBUTORS OF JOHNS-MANVILLE BUILDING MATERIALS; CURTIS WOODWORK

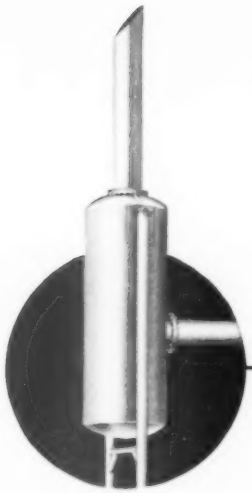
STURDYBILT PREFABRICATED, DEMOUNTABLE HOUSES

SOUTHERN MILL & MANUFACTURING CO. • TULSA, OKLAHOMA

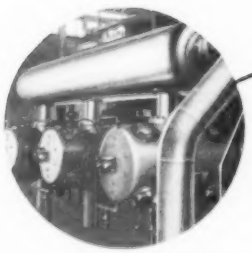
PREFABRICATED HOME MANUFACTURERS INSTITUTE phmi

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

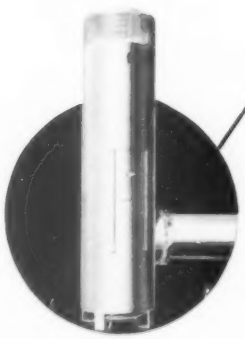
Pulsation Free COMPRESSOR PIPING *plus* *Quiet* ENGINE OPERATION *by* BURGESS-MANNING



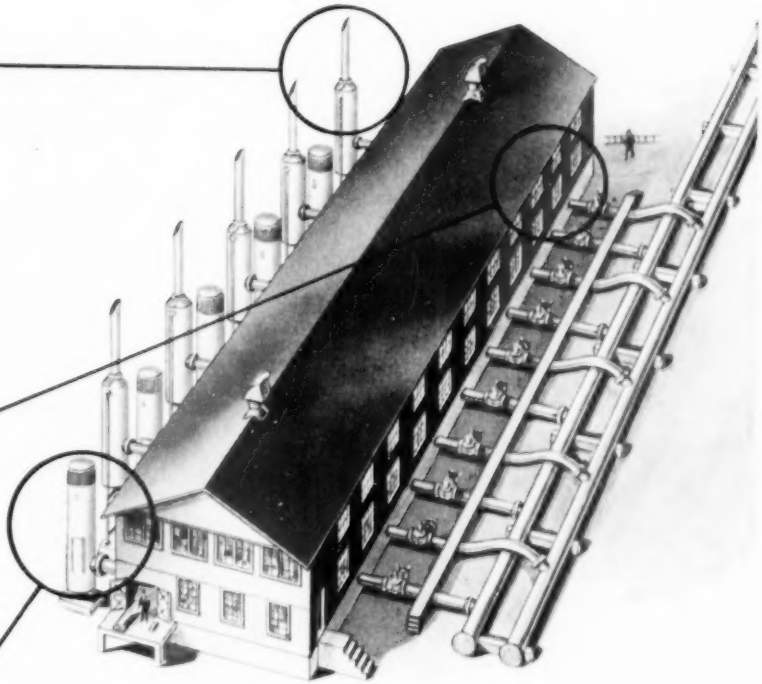
1 EXPLOSION RESISTANT
Engine Exhaust Snubber



2 PULSATION SNUBBER
Eliminates Gas Pulsation



3 AIR INTAKE
Cleaner Snubber



Burgess-Manning has designed a versatile line of Noise and Pulsation Snubbers, also Combination Air-Cleaner Snubbers, for engines and compressors to meet the exacting noise control and surge control needs of the petroleum and chemical industry. For example, here is how Burgess-Manning Snubbers can be effectively used in a compressor installation:

- Eliminate gas pulsation in compressor piping systems which often results in excessive vibration, material fatigue, and loss of efficiency.
- Reduce noise from exhausts of internal combustion engines . . . combine exhaust quieting with resistance to explosion.
- Clean intake air, prevent noise, and control suction line pulsation on engines driving compressors.

BURGESS-MANNING COMPANY

SOUND ENGINEERING

1203 Dragon Street
Dallas, Texas

CHICAGO, ILLINOIS • LIBERTYVILLE, ILLINOIS • REPRESENTATIVES: HOUSTON • TULSA • LOS ANGELES • ST. LOUIS • NEW YORK

REPUBLIC

From 2⅜" lines to 30" lines...

Other Republic Products include Casing and Tubing—Carbon, Alloy and Stainless Steels—Studs, Bolts and Nuts—Heat Exchanger Tubes

Electric Weld LINE PIPE...

Electric Resistance Weld and Electric Fusion Weld

Whatever the size of the line you're building, it will go in with a minimum of delays and other difficulties if it's Republic Electric Weld Line Pipe. Everything from a small gathering line to the largest gas line can be specified "Republic"... to your benefit.

The way it's made makes Republic Line Pipe uniform . . . uniformly flat steel is formed into a tube, then electric-welded to produce a uniformly strong pipe. Walls are uniform in thickness to give your crews pipe ends that match-up right, that weld evenly and uniformly. The ductile, low-carbon steel will weld readily, too. High ductility assures smooth, uniform bends in the field or the shop.

Freedom from scale makes the outer surfaces easier to wrap and protect with fewer holidays. Freedom from inside scale prevents loosening of scale after blowing-out, protects instruments and valves from clogging.

More than 67,000 miles of Republic Electric Weld Line Pipe and 23 years of service for many of these miles help prove that your best investment for transmission, gathering, distribution, and product lines is Republic Electric Weld Line Pipe...either Electric Fusion Weld or Electric Resistance Weld. Literature on both types is available from:

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

Republic REPUBLIC STEEL
ELECTRIC WELD LINE PIPE
Electric Resistance Weld and Electric Fusion Weld

Serving Industry for 45 Years
with

SUPERIOR SERVICE - DISTINCTIVE PRODUCTS

Engines • Generating Units • Pumps • Pumping Units

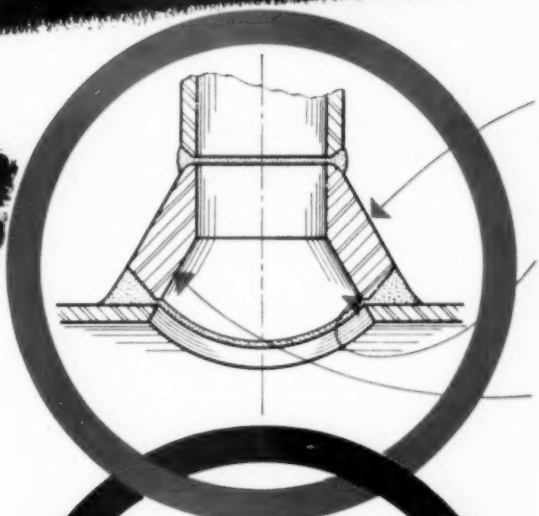
SOUTHERN ENGINE and PUMP COMPANY

MANUFACTURERS • MACHINERY FACTORS • CONTRACTORS

LE ROI ENGINE DISTRIBUTORS

SERVICE FACILITIES AT: HOUSTON, DALLAS, KILGORE, SAN ANTONIO, EDINBURG AND CORPUS CHRISTI, TEXAS — HOUMA AND NEW ORLEANS, LOUISIANA.

Engineered Reinforcement Against CORROSIVE ATTACK at Branch Connections



Designed with thick, tapered section to relieve stress concentration.

Additional metal prevents branch connection from corroding dangerously thin.

Funneled inlet relieves stress concentration at point of highest magnitude—the *inside* of the crotch.

Accelerated corrosion due to stress concentrations can be readily eliminated . . . by using WELDOLET WELDING FITTINGS at all 90° branch connections.

When corrosion exists in a piping system, it attacks the points of stress concentration most severely. WHY DOWN-RATE YOUR PIPING SYSTEM BECAUSE OF THIS WEAK LINK?

SPECIFY AND USE . . . . . BONNEY WELDOLET WELDING FITTINGS to insure 100% pipe strength at branch connections under corrosive conditions.

WeldOlets, butt-welding

ThredOlets

WeldOlets, socket-welding

FOR COMPLETE ENGINEERING DATA WRITE FOR YOUR BONNEY W-3 CATALOG

DISTRIBUTORS IN PRINCIPAL CITIES

WELDING FITTINGS DIVISION

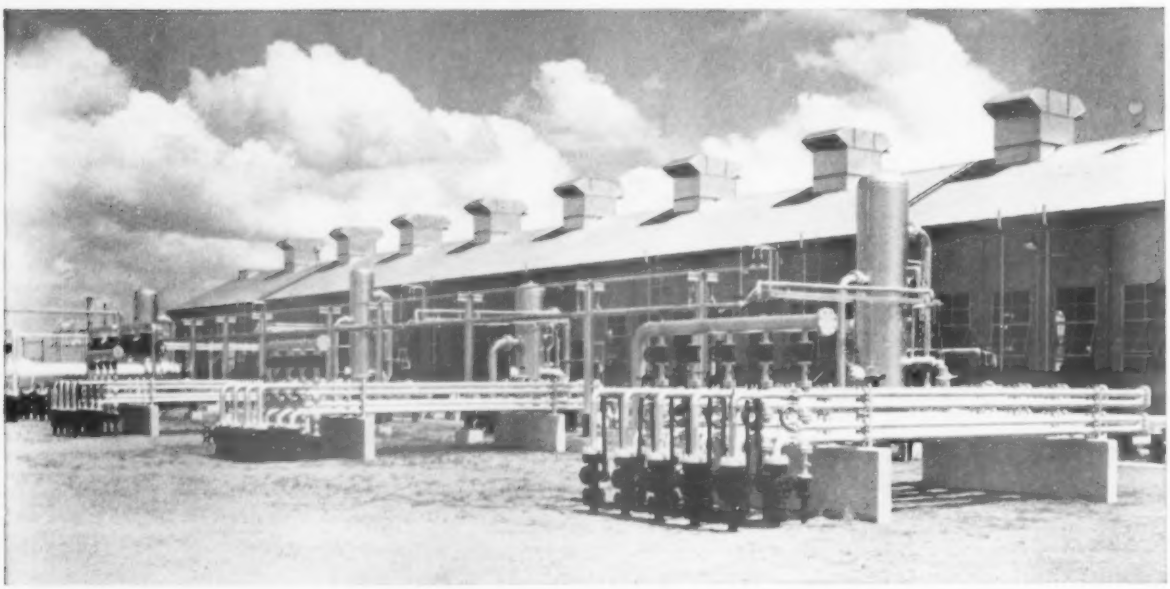
BONNEY FORGE & TOOL WORKS

ENG. DEPT., 366 GREEN STREET

ALLENTOWN, PENNSYLVANIA

Assure Top Efficiency

in your plant with



BROWN FINTUBE *Sectional* HEAT EXCHANGERS

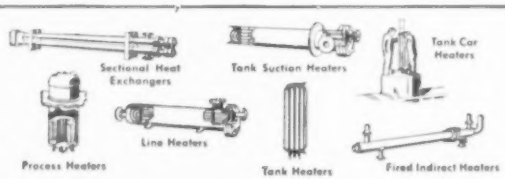
● Avoid the loss in efficiency that results from just a few thousandths of an inch of deposit on the tubes, by using Brown Fintube Sectional Exchangers for every heating and cooling service.

The longitudinal passages of Brown Fintube Sections control the material flow, eliminating baffles and the back eddies that encourage fouling. Their greater heating surface — 2 to 8 times that of bare tubes — permits more BTUs to be transferred at lower temperature per square foot of surface, minimizing "coking" and charring. Brown Fintube Sections are easy to clean — and — by simply manifolding a few extra sections into the unit, one stream after another can be taken off line for cleaning while the rest — always thoroughly clean — carry the unit's full rated capacity, year after year — without any shut-downs.

Efficient heating, is only one of Brown Fintube's many advantages. You'll find full details in our Bulletin No. 512. It will give you ideas.

BROWN FINTUBE
HEAT TRANSFER PRODUCTS

BROWN FINTUBE CO.
Elyria, Ohio

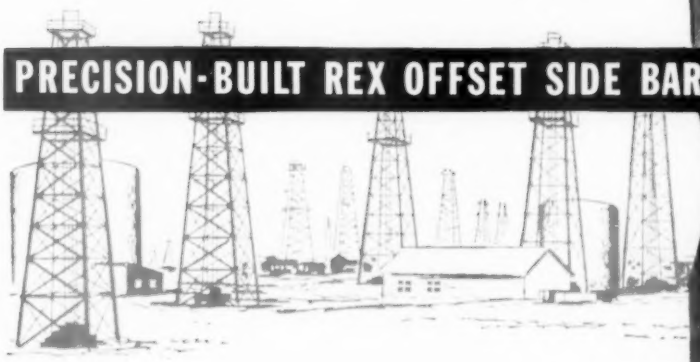


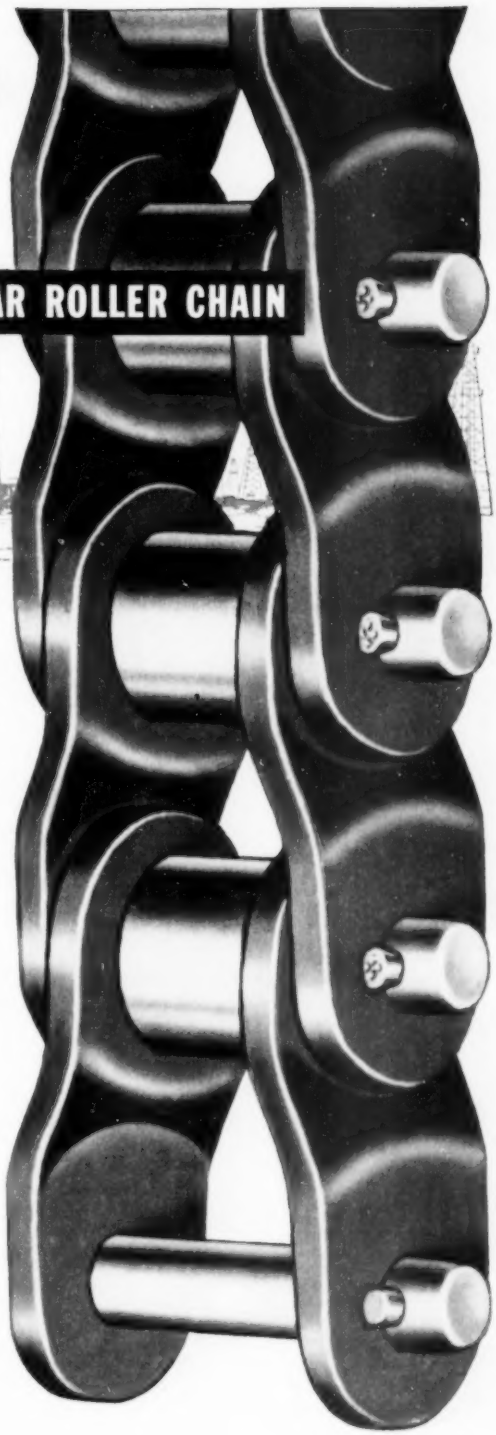
NEW YORK • BOSTON • PHILADELPHIA • PITTSBURGH • BUFFALO • CLEVELAND • CINCINNATI • DETROIT • CHICAGO • ST. PAUL • ST. LOUIS • KANSAS CITY
MEMPHIS • BIRMINGHAM • NEW ORLEANS • SHREVEPORT • TULSA • HOUSTON • DALLAS • DENVER • LOS ANGELES • SAN FRANCISCO • and ST. THOMAS, ONT.

A Great OIL FIELD CHAIN

NOW BETTER THAN EVER!

PRECISION-BUILT REX OFFSET SIDE BAR ROLLER CHAIN





Rex Offset Side Bar Roller Chain, for years a favorite in the oil fields, is now better than ever. Improved materials plus the finest manufacturing techniques and heat treatment make it the ideal chain for high-speed, low-cost drilling. It is built to the same exacting tolerances and finishes as highest quality standard roller chain.

And you still get these outstanding Rex features . . .

- ★ It's built to take it . . . built-in clearances between working parts enable chain to operate under the toughest conditions.
- ★ Pins are heat-treated to resist shock loads. All parts are highly finished.
- ★ It's easy to couple and uncouple. Links exactly alike. No special coupler links to deal with. Can be lengthened or shortened by adding or removing only 1 pitch.
- ★ It comes boxed in convenient 10-foot lengths.
- ★ Runs over same sprockets as standard A.S.A. roller chain. Available from 1¼" to 2" pitch in single and multiple strands.

For all the details write for Oil Field Chain Bulletin No. 52-3. Chain Belt Company, 4619 W. Greenfield Ave., Milwaukee 1, Wis.

VISIT OUR BOOTH IN THE TEXAS BUILDING AT THE OIL SHOW

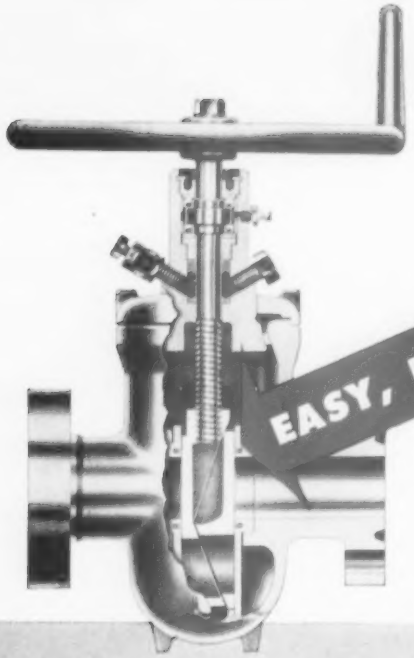
CHAIN BELT REX COMPANY

Chain Belt COMPANY OF MILWAUKEE

OIL FIELD SALES OFFICES

New York • Tulsa • Dallas • Houston • Midland • Los Angeles

"Sold in leading supply stores throughout the oil country."

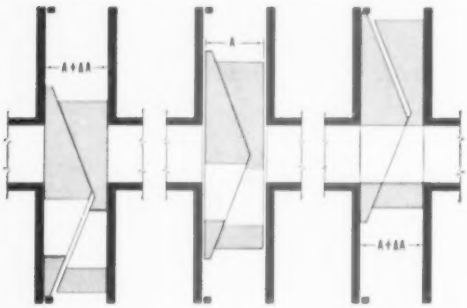


EASY, POSITIVE SHUT-OFF HERE..

MEANS SURE, SAFE CONTROL HERE!

W-K-M Parallel Expanding Gate provides a pressure-tight seal, open and closed — permits free-running operation under full-rated pressure.

Double-thrust Roller Bearings, ground stem threads, superfinished stem where it passes through the packing, contribute to the easy operation of W-K-M valves.



In closed position, the gate (left) and segment (right) seal tightly against both seats.

When opening or closing, the gate and segment are in neutral position, permitting free upward or downward movement of the gate assembly.

When open, the gate and segment again seat tightly against both seats and the bore of each lines up perfectly to provide a smooth, turbulence-free passage.

For the greatest safety, greatest operating reliability, oil men the world over specify W-K-M valves for their Christmas trees. The basic design of W-K-M valves (illustrated at left) provides a sure, tight seal in opened and closed positions and free-running operation while opening or closing.

Oil men specify W-K-M, too, because of its large and competent field organization qualified to render field emergency service and assist W-K-M valve users in any valve problem. W-K-M valves may be serviced and even completely overhauled without removing them from the Christmas tree.

Specify W-K-M for the surest and safest well control — for W-K-M valves are by far the most economical in the long run. 80% of the world's high pressure wells are controlled by W-K-M valves.

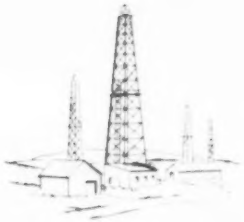
All W-K-M Valves Have

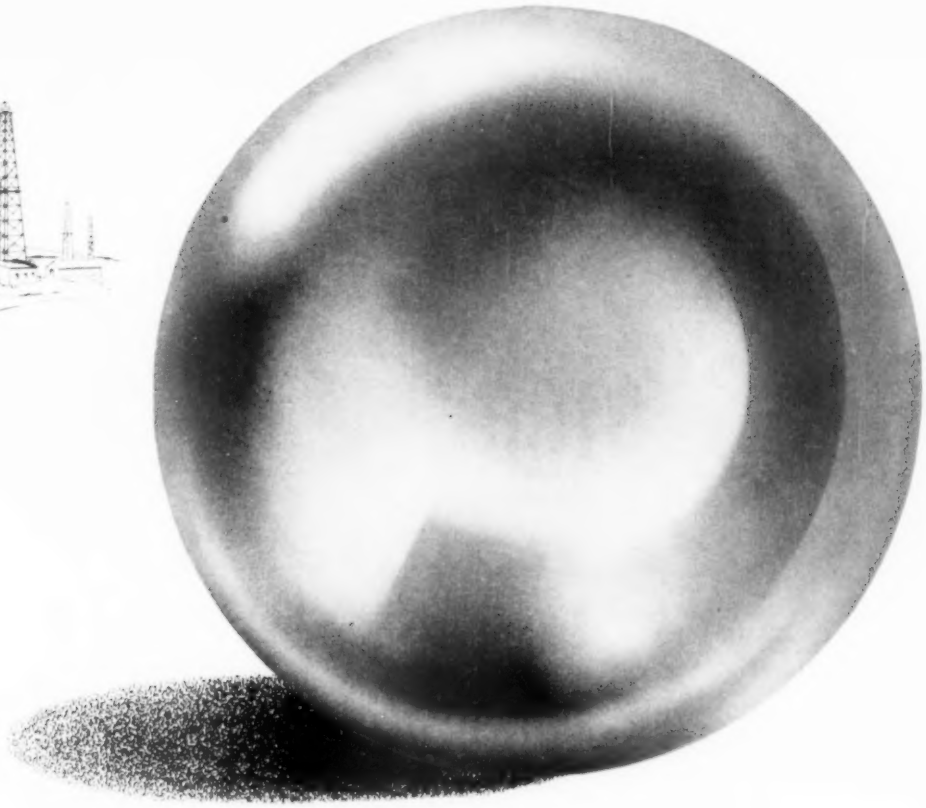
Through-Conduit Fluid Passage • Parallel Expanding Gate Assembly • Oversize Replaceable Seats Pressure Seal Bonnet • Double Row Thrust Bearings on Stem • Internal Lubrication

W-K-M COMPANY
P. O. BOX 2117 HOUSTON 1, TEXAS
727 W. SEVENTH STREET, LOS ANGELES, CALIF.
EXPORT OFFICE: 30 Rockefeller Plaza, New York, N. Y.

W-K-M *Valves*

OILFIELD • PIPE LINE • PROCESS VALVES





NEW light-weight titanium-carbide* ball

Kennametal Titanium-Carbide Balls are ⅓ lighter than alloy steel, resist shock and wear over 20 times longer.

Used in sub-surface check valves, their remarkable lightness minimizes down-the-hole trouble caused by ball flutter, cage wear, and fluid pounding.

Diamond-like hardness of Kennametal Titanium-Carbide Balls increases valving efficiency in pumping flour sand cut fluids and other abrasive mixtures. Sphericity is maintained in conditions of severe impact, ball spin wear, and cage beating.

Titanium carbide and nickel content of Kennametal Light-weight Balls assures high resistance to corrosion and electrolytic action. They provide unexcelled performance in sour crudes and hydrogen sulfide gases.

•

You can obtain Kennametal Light-weight Titanium-Carbide Balls from your regular supplier.

*Called Kentanium

KENNAMETAL®

PUTS AN END TO DOWN-THE-HOLE CHECK VALVE TROUBLE

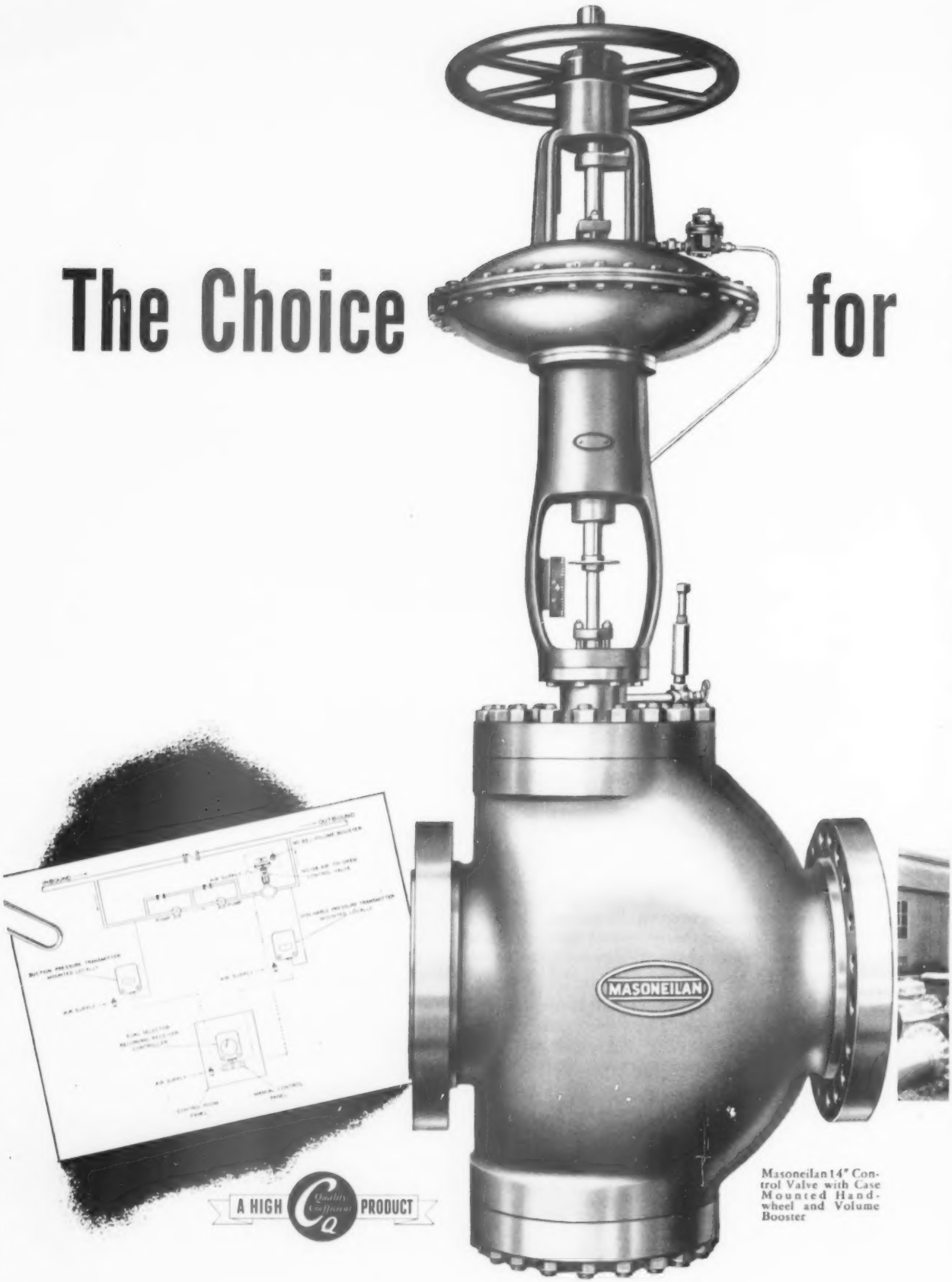
Quality Sintered Carbide API Balls and Seats

Manufactured by

Kennametal Inc., Latrobe, Pa.

SOLD BY YOUR REGULAR SUPPLIER

The Choice for



A HIGH Quality Coefficient PRODUCT

Masoneilan 14" Control Valve with Case Mounted Handwheel and Volume Booster

MASONEILAN

REG. U.S. PAT. OFF.

Major Petroleum Pipe Lines

MASONEILAN

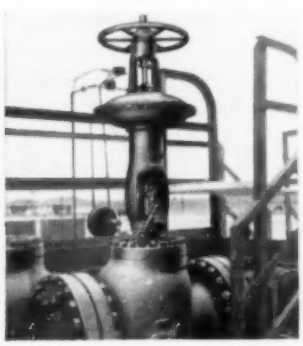
Pipe Line Control Valves

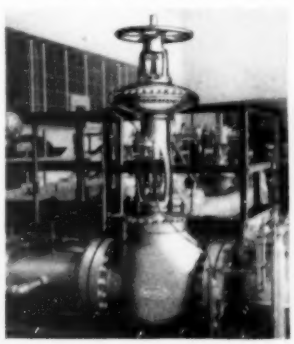
For years Masoneilan Control Valves have been the inevitable choice for large petroleum pipe line applications because Mason-Neilan has kept out front in development of pipe line valves. Only Mason-Neilan builds control valves, especially for pipe lines, including all these rugged structural features:

- extra large — 24 inch diameter — molded diaphragms with 330 sq. in. effective area.
- extra long stroke — up to 4 inches.
- 6-30 psi spring range plus large diaphragm area insures powerful motor.
- large diameter stems in keeping with generally rugged construction.
- steel diaphragm cases.
- spring barrel designed to permit use of cast steel yokes where required.
- extra long, heavy top and bottom plug guides.
- solid valve plugs of V-port design.
- oversize flanges available (e.g. 14" body with 18" flanges).
- sizes up to 16" with body ratings to 1440 psi @ 100°F.
- high C_v with minimum pressure drop in open position, combined with desirable flow characteristics.

These superior features, combined with acknowledged Masoneilan quality, constitute still another example of why you get more for your money when you buy Masoneilan Control Valves.

Typical Installations of Masoneilan Pipe Line Control Valves





MASON-NEILAN

REGULATOR COMPANY

1185 ADAMS STREET, BOSTON 24, MASS., U. S. A.

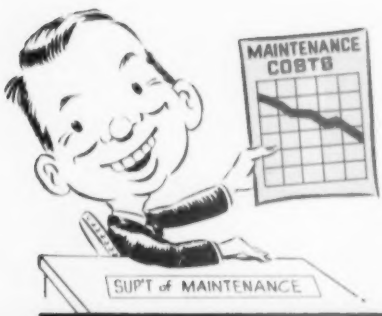
Sales Offices or Distributors in the Following Cities: New York • Syracuse • Chicago • St. Louis • Tulsa • Philadelphia • Houston Pittsburgh • Atlanta • Cleveland • Cincinnati • Detroit • San Francisco • Boise • Louisville • Salt Lake City • El Paso • Albuquerque Charlotte • Los Angeles • Corpus Christi • Denver • Appleton • Birmingham • New Orleans • Dallas • Seattle

Mason-Neilan Regulator Co., Ltd., Montreal and Toronto

KYSOR's "up front" on these giant Euclids on the world-famed Iron Range . . . teamed with Euclid engineering to keep these monsters fighting fit the year 'round.

KYSOR sees plenty of Pacific Northwest scenery from the nose of these Peterbilt tractors in 2200 mile weekly hauls for famous Tea Garden Foods of San Leandro, California.

Jams 'n Jellies or Iron Ore...
KYSOR *delivers All-Season savings!*



Whether it's Peterbilt tractors toting delicious Tea Garden jellies or giant Euclids sweating it out on the Minnesota Iron Range . . . MAINTENANCE COSTS ARE VITAL!

That's why there's KYSOR shutters "up front" to keep these power plants operating 'round the calendar at perfect operating temperature.

In Death Valley heat or Alaskan cold . . . on the 4th of July or on Lincoln's birthday, KYSOR delivers *all-season* savings on fuel and maintenance by holding operating temperatures within that magic 8° range. Result: Longer engine life, fewer major overhauls and fuel savings up to 12%.

Wherever engines work—KYSOR does a savings job! Write for complete information.

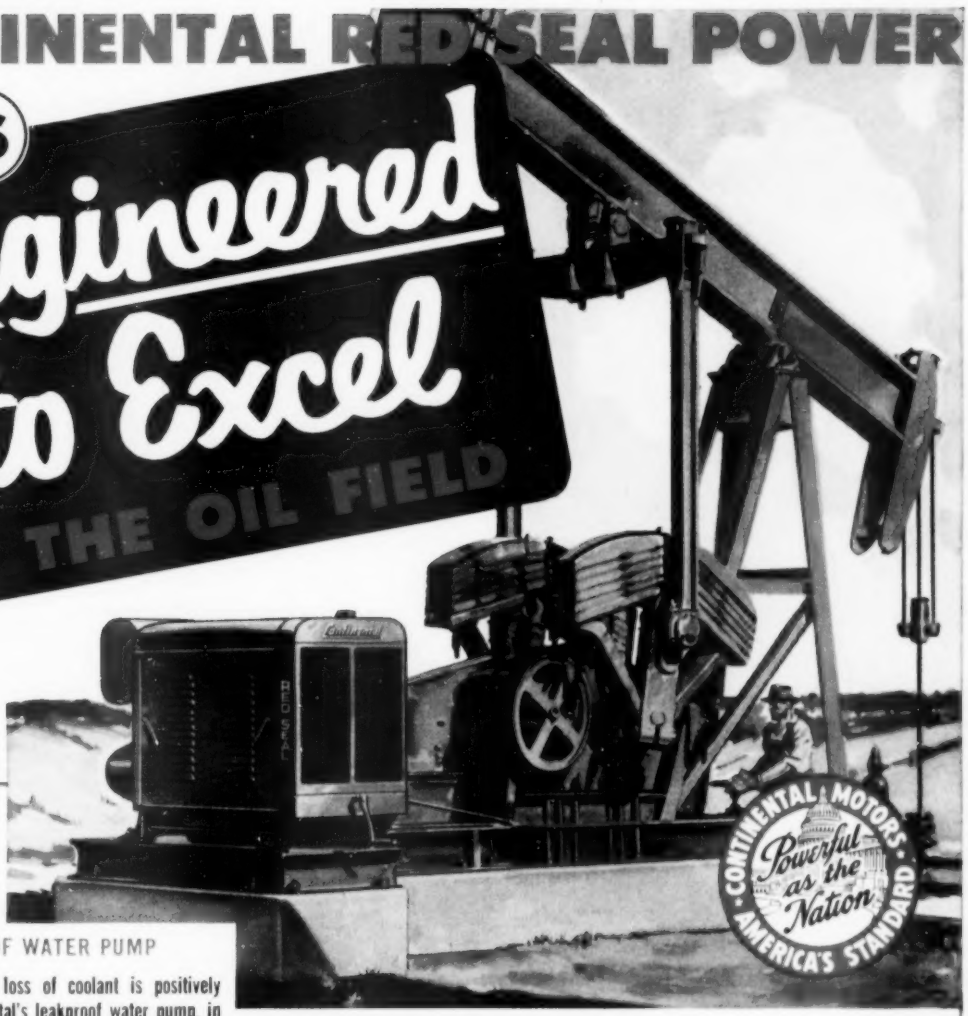
KYSOR
***Automatic* SHUTTERS**

"Wherever Engines Work"

KYSOR HEATER COMPANY - CADILLAC, MICH.

CONTINENTAL RED SEAL POWER

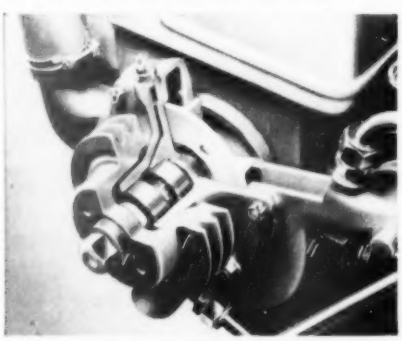
IS Engineered to Excel IN THE OIL FIELD



SEE OUR CATALOG IN COMPOSITE CATALOG

LEAKPROOF WATER PUMP

Potentially disastrous loss of coolant is positively prevented by Continental's leakproof water pump, in which spring-loaded carbon disc within the impeller housing maintains a seal against corrosion-resistant stainless steel seat. Note too the widely-spaced bearings, and provision for keeping space between them packed with lubricant. One of many outstanding features of Continental Red Seal engineering.



Continental Red Seal oil field power is engineered and built with the rigorous requirements of oil field use in mind. A product of more than 50 years' specialized experience, it embodies an array of quality features—many of them exclusive—making for economy, dependability and long troublefree life. What is equally important, it has the backing of genuine parts and factory-authorized service from coast to coast, wherever there's Red Seal power in use.

•

6218 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS
3817 S. SANTA FE AVE., LOS ANGELES 58, CALIFORNIA

Continental Motors Corporation

MUSKEGON, MICHIGAN

P&H Diesel Engines

(2-CYCLE)

Can your diesels tie this for Turbulence?

See those intake ports? . . . how they're machined at a compound angle? That's the basis of P&H's exclusive "Whirl-air" intake. As the piston clears these ports on its down stroke, air rushes through the ports, developing a whirlwind within the cylinder that picks up atomized fuel for the effective 2-cycle expansion stroke.

Here's turbulence at its best. More complete atomization — more complete combustion — more thorough scavenging of burned gases. More power!

P&H offers you the only 2-cycle diesels with this outstanding feature. Yet, it's only one of many advantages you'll find in this advanced P&H line . . . with 1, 2, 3, 4 and 6-cylinder models — from 20 to 138 h.p.

Ask your P&H Diesel representative for full details. Or write us.

"WHIRL-AIR" INTAKE PORTS

P&H DIESEL DIVISION
HARNISCHFEGER CORPORATION
CRYSTAL LAKE, ILLINOIS

the P&H Line

Announcing–the new LPD design **Clipper Oil Seal**

The design of the new LPD Clipper Seal assures that the spring which controls the lip contact on the shaft will be held tightly in the seal. It further provides a husky lip section that enables better control of lip flexing, and better utilization of the full available depth of the lip section.

. . . an efficient, all-purpose seal with long life and a wide range of applications

EXHAUSTIVE FIELD TESTS and customer usage show that the new Type LPD Clipper Seal has a wider range of applications than any other oil seal design.

It provides better retention of lubricant and more thorough exclusion of dirt and abrasives. This holds true even at higher shaft speeds and despite wide equipment variables. It can be used for practically any application with greater assurance of fewer replacements.

The new Type LPD Clipper Seal runs cool and lasts longer because it requires less lubrication over its lip bearing area. Furthermore, the LPD design provides better utilization of the lip section of the seal—another factor in prolonging its life. And the greater flexibility of this lip section improves the performance of the seal.

The heel and lip compounds in which the new Type LPD Clipper Seal is available enable it to withstand a wide range of service conditions and temperatures. For more information about the new Type LPD Clipper Seal, write Johns-Manville, Box 60, New York 16, N. Y.

JOHNS-MANVILLE PRODUCTS

Johns-Manville CLIPPER SEALS

IT FLOATS ON THE LOAD! *

You turn on the steam.

This little stainless steel valve—the only moving part in the Yarway Impulse Steam Trap installed on the equipment—opens wide and *stays* open as the air and condensate continuously pour through.

The equipment reaches production temperature in the quickest possible time.

Production temperature reached, the little valve snaps shut. After that, by a pulsating action, it discharges all condensate as it forms—even a tiny teaspoonful. *There's hot steam in the equipment all the time* . . . steady, maximum temperatures are maintained.

It all adds up—to more production per day.

Other profit-making features of the Yarway Impulse Steam Trap—low initial cost, easy installation, stainless steel construction, low maintenance, good for all pressures, quick delivery from over 200 local industrial distributors.

Try a Yarway—free for 60 days—and *prove* its advantage. Your distributor will supply you.

For free Yarway Impulse Steam Trap Bulletin T-1740, write . . .

YARNALL-WARING COMPANY
136 Mermaid Ave., Philadelphia 18, Pa.

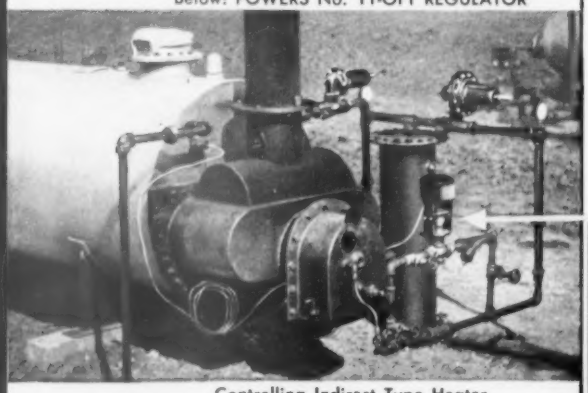
* . . . *resulting in fast heat-up of equipment, more production per day.*

YARWAY | ***impulse steam trap***

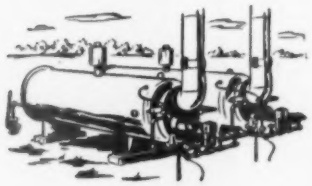
Want BETTER temperature control

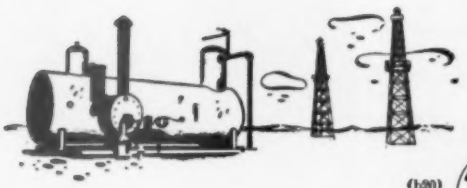
For HEATERS and TREATERS?

Below: POWERS No. 11-OFT REGULATOR



Controlling Indirect Type Heater





(b20)

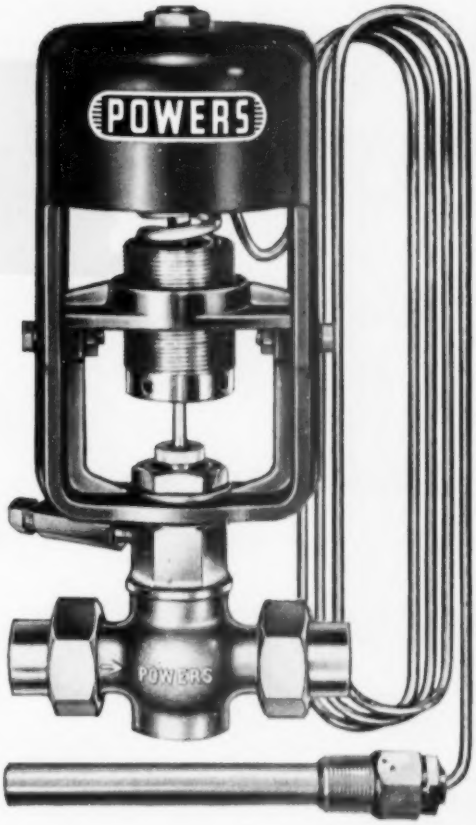
use POWERS No. 11-OFT Self-Operating REGULATORS

★

They give long trouble-free service without repairs

★

No "freeze-ups" down to −60° F



Note these Features that Give Better Control and Lasting Reliability

1. Thermal system has OVER-heat protection. Powerful two-ply bellows and single seat composition disc valve assures tight shut off.
2. **Valve stem lubricator** helps give closer control, reduces packing gland troubles.
3. Rugged, built for long reliable service in all kinds of weather. Operate efficiently down to 60° F. below zero.
4. **Durable Valves** Sizes ¾" and 1" are direct acting, have single seat bronze body with double unions, for easy installation, composition disc and stainless steel seat.
5. **Temperature adjustment range:** 110 to 190° F., other ranges between 30 to 370° F.
6. **Bulb Well** is cadmium plated steel and extra heavy plain capillary tubing is 10 ft. long.

Powers No. 11 Temperature Regulators are backed by over 60 years experience making self-operating controls. They are used by leading manufacturers of heaters and treaters.

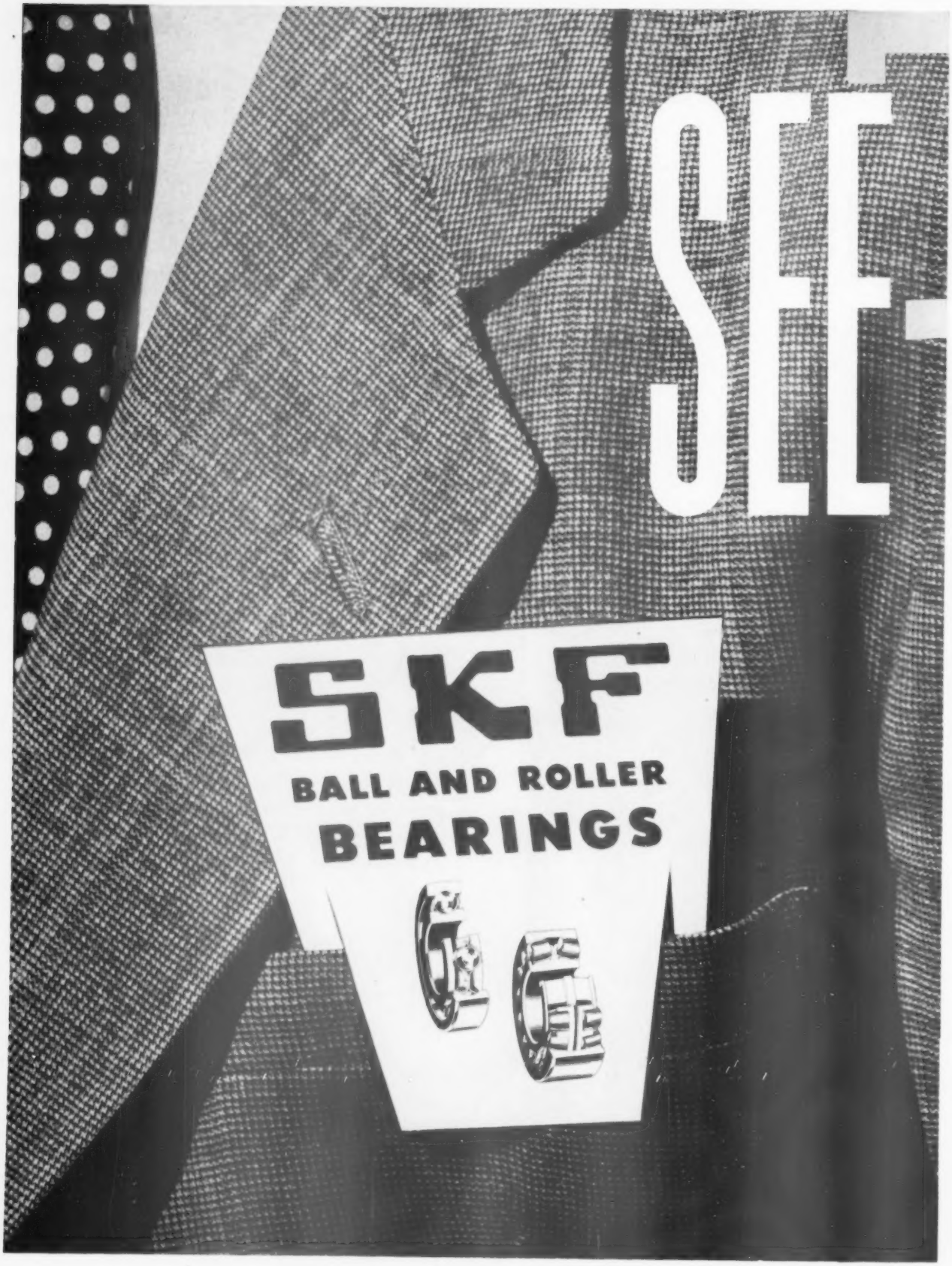
Service available from over 50 cities in the U. S. A., Canada and Mexico.

THE POWERS REGULATOR COMPANY

SKOKIE, ILLINOIS • Offices in Over 50 Cities in U. S. A., CANADA and MEXICO

See Your Telephone Directory

OVER 60 YEARS OF AUTOMATIC TEMPERATURE CONTROL


SEE
SKF
BALL AND ROLLER
BEARINGS

THE MAN WHO WEARS THIS BADGE

AT THE

International Petroleum Exposition

TULSA **MAY 14–23** **BOOTHS 67 and 68**

He will help you put the right bearing in the right place

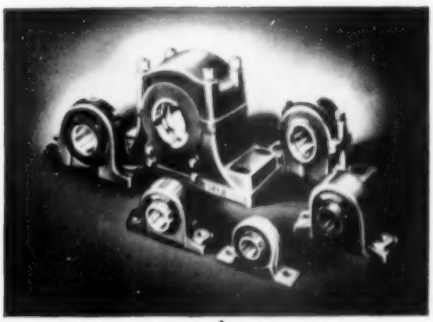
SEE how SKF Field and Home Office Engineering is solving anti-friction problems in all kinds of oil field equipment.

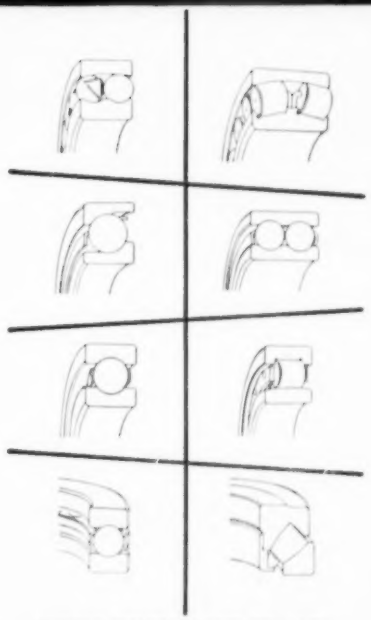
SEE a demonstration of the System of Hydraulic Mounting and Removal developed and pioneered by SKF.

SEE SKF's all-purpose bearing line which serves virtually every oil equipment need.

SEE how quickly and easily SKF split housing pillow blocks can be assembled.

SEE the completeness of SKF's pillow block line . . . machined to rigid standards . . . properly proportioned, with accurate bearing seats.





SKF'S COMPLETE LINE OF ANTI-FRICTION BEARINGS AND PILLOW BLOCKS, PLUS SKF ENGINEERING CO-OPERATION, HELPS YOU *PUT THE RIGHT BEARING IN THE RIGHT PLACE.*

DO THESE THINGS at the International Petroleum Exposition, May 14 - 23, at Tulsa, Booths No. 67 and 68.

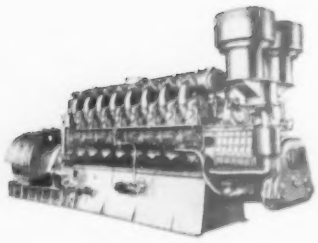
SKF INDUSTRIES, INC., PHILADELPHIA 32, PA. — *manufacturers of* SKF *and* HESS-BRIGHT *bearings.* 7425

SKF®

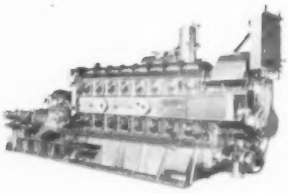
BEARINGS AND PILLOW BLOCKS

POWER

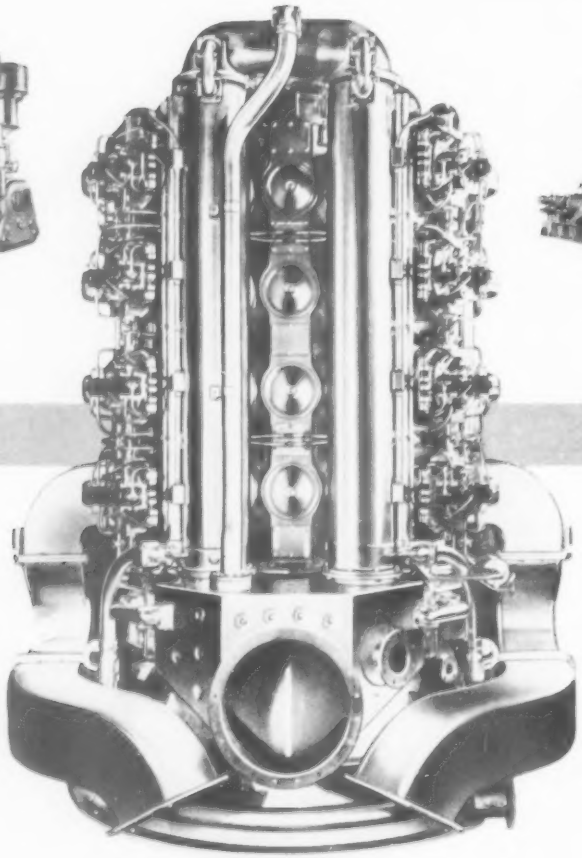
for Petroleum Utilities and Marine Applications



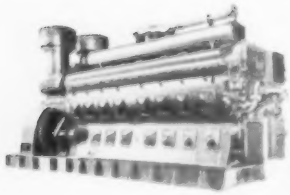
MODEL 16-278A



MODEL 8-268A



MODEL 16-358



MODEL 16-567B

MODEL 16-338

Cleveland Diesel Engine Division

GENERAL MOTORS • CLEVELAND 11, OHIO

Tie Up to GM Service

Sales and Service Offices: Cambridge, Mass. • Chicago, Ill. • Jacksonville, Fla. • Miami, Fla. Montreal, P. Q. • New Orleans, La. • New York, N. Y. • Norfolk, Va. • Orange, Texas • San Diego, Calif. • San Francisco, Calif. • Seattle, Wash. • St. Louis, Mo. • Tampa, Fla. • Toronto, Ont. Vancouver, B. C. • Washington, D. C. • Wilmington, Calif.

GM
GENERAL MOTORS
DIESEL POWER

CP DRILL COLLARS

The straight smooth inside bore of all CP Drill Collars eliminates harmful offsets and washouts. CP's special heat treating and boring processes assure uniform, wall-to-wall hardness and precisioned straightness at all sections. Uniform wall thickness assures proper balance to minimize warping and whipping.

All threads are hobbed to maintain accurate thread form. Collars are available in lengths up to 55 feet.

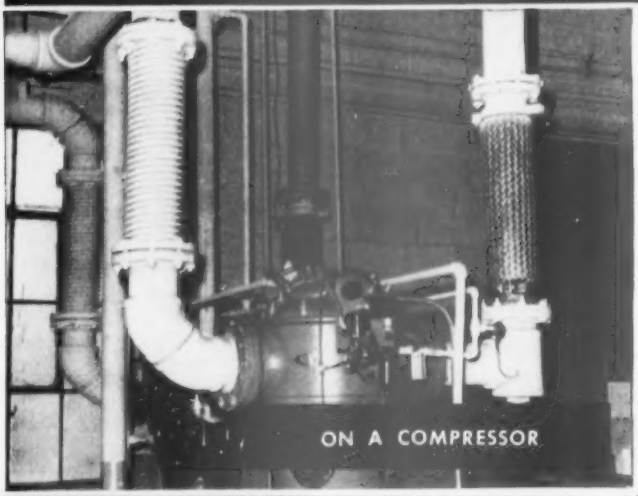
For complete information, write Chicago Pneumatic Tool Company, Oil Tool Division, 1 N.W. 16th Street, Oklahoma City, Oklahoma.

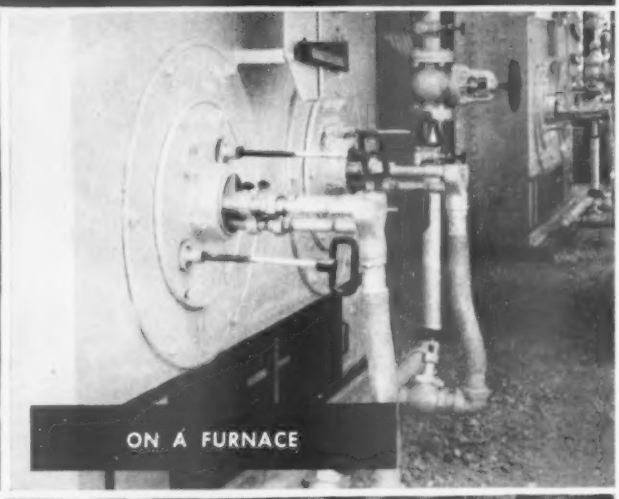
Chicago Pneumatic

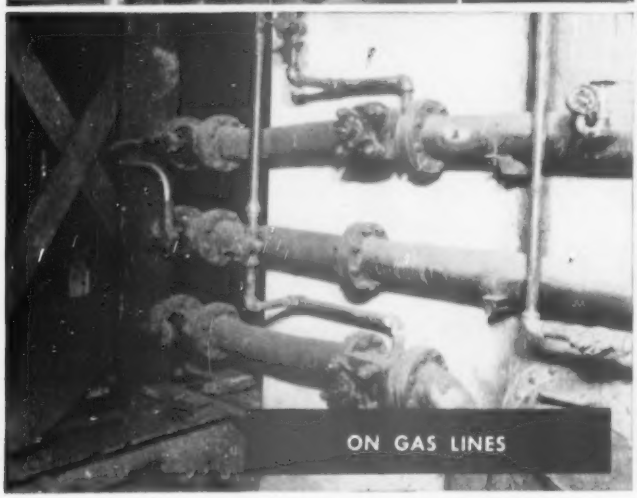
IN CANADA: 10103 81st Ave., So. Edmonton, Alberta, Canada. • IN MEXICO: Mexico, D. F., Rosas Moreno No. 41; Tampico, Pamps., Apartado No. 174. • SPECIAL OIL TOOL EXPORT AGENT: E. F. Gahan, Inc., 500 Fifth Ave., New York 17, N. Y. (West Indies, Central and South America, exclusive of Mexico.)

Wherever vibration, flexation, misalignment or

make the connection with CMH







■ CMH Flexible Metal Hose, properly used, can save many times its cost by eliminating piping failure due to motion and fatigue stress . . . by simplifying installation . . . by reducing the number of fittings required . . . by minimizing downtime required for piping maintenance. In CMH flexible metal hose, you get the rugged durability of metal combined with a high degree of flexibility. You get a non-aging, non-contaminating, non-collapsible assembly with no joints to pack, assuring a long, dependable, maintenance-free life.

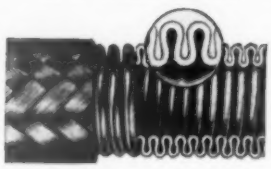
In the CMH complete line of flexible metal hose products there is the exact type to meet your needs. Pressures from vacuum to 24,000 psi (burst) can be accommodated. A wide variety of metals is offered, too, to provide hose types which are corrosion resistant, fire resistant and capable of handling extremely searching liquids and gases.

Whenever, a connection problem involves vibration, flexation, misalignment or expansion and contraction, think first of CMH flexible metal hose for an economical, dependable and safe solution. Your Flexonics distributor will be pleased to go over your requirements with you. Look for his name in the classified pages of your telephone directory or write and we will send it.

expansion and contraction is a problem.....

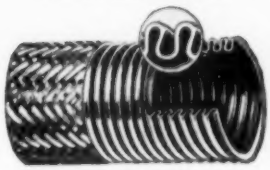
FLEXIBLE METAL HOSE

REX-WELD HOSE



CMH REX-WELD corrugated steel hose in sizes from 3/16" through 24" I.D. for burst pressures to 12,000 psi, temperatures to 1000°F. Also available in bronze.

REX-FLEX HOSE



CMH REX-FLEX corrugated stainless steel hose in sizes from 5/16" through 2" I.D. for burst pressures to 24,000 psi, temperatures to 1600°F.

REX-TUBE TYPE RT-6

CMH REX-TUBE Type RT-6 fully interlocked flexible tubing in galvanized steel, aluminum, brass and other metals; sizes ½" through 8" I.D.

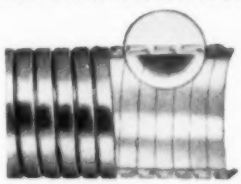
REX-TUBE TYPE RT-15

CMH REX-TUBE Type RT-15 fully interlocked steel or bronze utility hose in sizes from ½" to 12" I.D. for pressures to 750 psi. (constant), temperatures to 600°F.

REX-TUBE TYPE RT-20

CMH REX-TUBE Type RT-20 steel or bronze ball bearing type utility hose in sizes from 3/16" through 1¼" I.D. for low to moderate pressures and temperatures.

ABRASION RESISTANT HOSE



CMH "Abrasion Resistant" hose Type AR-1, fully interlocked with strip inner liner for handling grain, forage, ashes and other dry solids, 1½" to 12" I.D.

Catalog 130 gives specifications and application data on CMH flexible metal hose. Write for your copy or see Flexonics catalogs in Sweet's, Chemical Engineering Catalog or The Refinery Catalog.

CHICAGO METAL HOSE Division

Flexonics *Corporation* 1345 South Third Avenue, Maywood, Illinois

In Canada: Flexonics Corporation of Canada, Ltd., Brampton, Ontario

Flexon identifies CMH products that have served industry for over 50 years.

Flexible metal hose

Expansion joints

Aircraft components

Metallic bellows

For drives like these, or for mud pumps . . . rotary . . . or *any* field drive, Dayton Thorobred V-Belts give dependable, trouble-free performance.

The Thorobred V-Belt is ideal for field applications: Its rugged cover is made of rubber filled *all weather* "Hi-Twist" fabric, and its sturdy cords are made of continuous filament, high tenacity rayon—processed on Dayton's exclusive electronic train.

You get dependable *service* from Dayton, too—from conveniently located warehouse stocks, and from Dayton's Field Engineering Service. Get in touch with the Dayton Distributor or Warehouse in your area whenever you have a drive problem. They're always glad to help, and of course, there's no obligation on your part.

DAYTON RUBBER COMPANY, DAYTON 1, OHIO

V-Belts by **Dayton Rubber**

Since 1905

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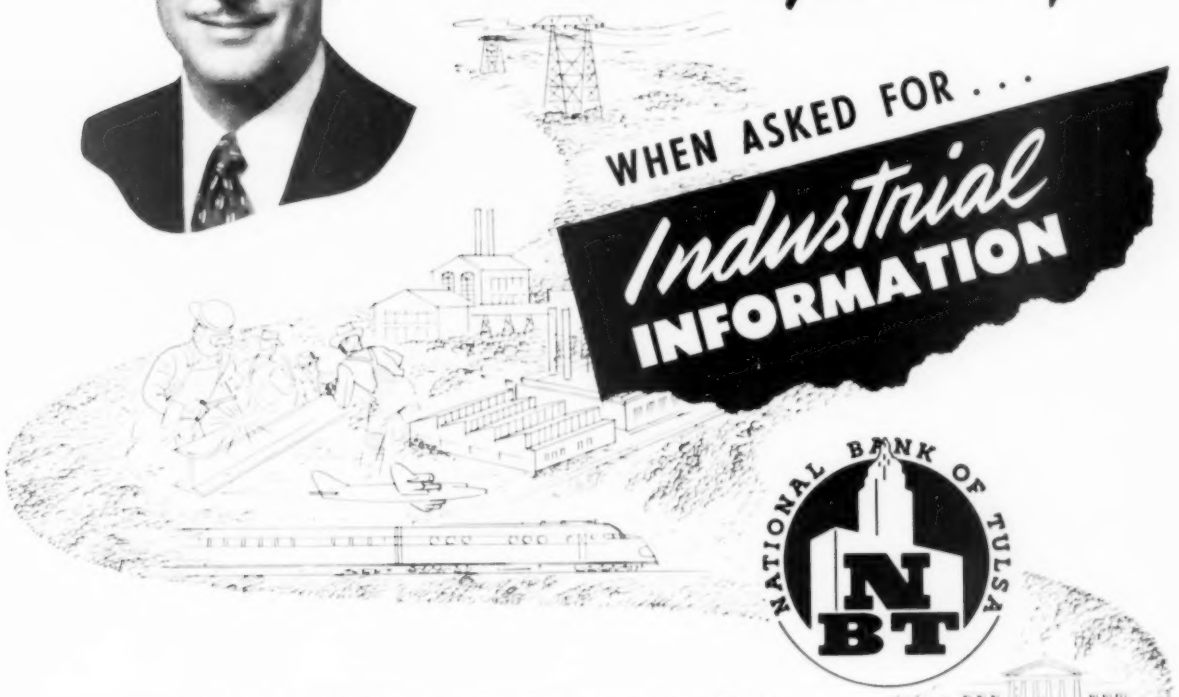
WORLD'S LARGEST MANUFACTURER OF V-BELTS

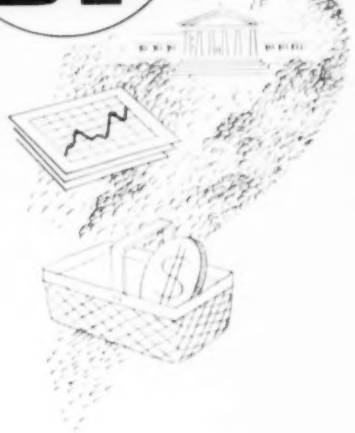
Mr. Wright Writes Right Away

WHEN ASKED FOR . . .

Industrial INFORMATION



You can supply your customers promptly with industrial information about this area . . . just contact Mr. Wright of the NBT Industrial Department. Whether for facts about utilities, natural resources, factory sites and markets — or data on labor, buying power, transportation and taxes — you can count on reliable information and dependable service from L. Harold Wright at NBT.



The Oil Bank of America

NATIONAL BANK OF TULSA

OFFERING COMPLETE BANKING AND TRUST SERVICES

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For faster, safer clearance that lasts for years

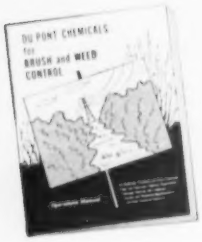
Kill Brush with Du Pont Ammate®

Many users report one spray with Du Pont "Ammate" kills brush so thoroughly that repeat sprays are not needed for years.

In most cases, when the original spray job is done well, brush is kept under control with nothing more than occasional spot sprays starting five or more years later. This assures lower cost brush control with less work for your maintenance crews or custom sprayers.

Here's why "Ammate" works so well.

- **Kills roots of brush as well as tops, yet allows low-growing natural cover to come back.**
- **Control lasts for years, saves labor of hand cutting or annual spraying.**
- **Reducing to a minimum the hazard of damage by spray drift.**
- **Not hazardous to operators, livestock or wildlife. Nonflammable.**



Free illustrated booklet describes how to control brush in rights of way with Du Pont "Ammate" weed and brush killer. For your copy, write Du Pont, Grasselli Chemicals Dept., Wilmington, Del.

On all chemicals always follow directions for application. Where warning or caution statements on use of the product are given, read them carefully.

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

MATCHED LIKE PEAS IN A POD

Each belt pulls its full share and gives even distribution of load when you use matched sets of Test Special V-Belts. The result: Maximum V-drive performance and longer service.*

All Continental Stores stock matched sets — and only matched sets — of New York Belting and Packing Company's TEST SPECIAL V-BELTS.

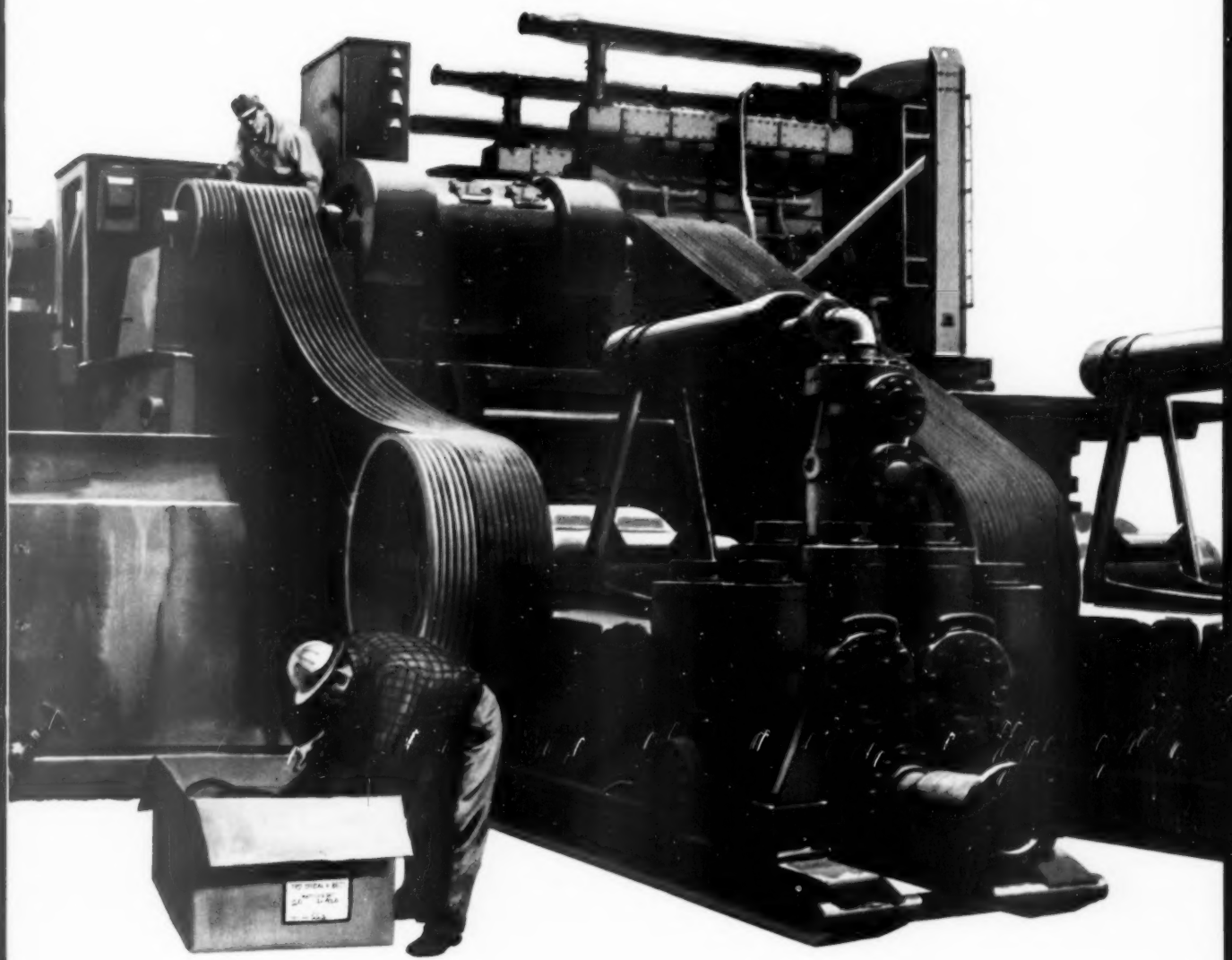
** Proper installation is important for extended service life.*

NEW YORK BELTING & PACKING CO. Founded 1846

CONTINENTAL

Serving the Oil and Gas Industries

THE CONTINENTAL SUPPLY COMPANY
General Offices: DALLAS, TEXAS
Representatives in All Principal Oil Fields of the World



Ready!

NEW BEDFORD CORDAGE

Cat Lines . . . Bull Rope . . . Drilling Cable . . . Torpedo Lines . . . Plain Laid Rope . . . Spinning Lines . . . you're ready for the best in cordage performance when you have New Bedford on the location. New Bedford is made from the highest grade manila fibre obtainable. For nearly a century its performance has proved "There's None Better!"

THE CONTINENTAL SUPPLY COMPANY
General Offices: DALLAS, TEXAS
Representatives in All Principal Oil Fields of the World

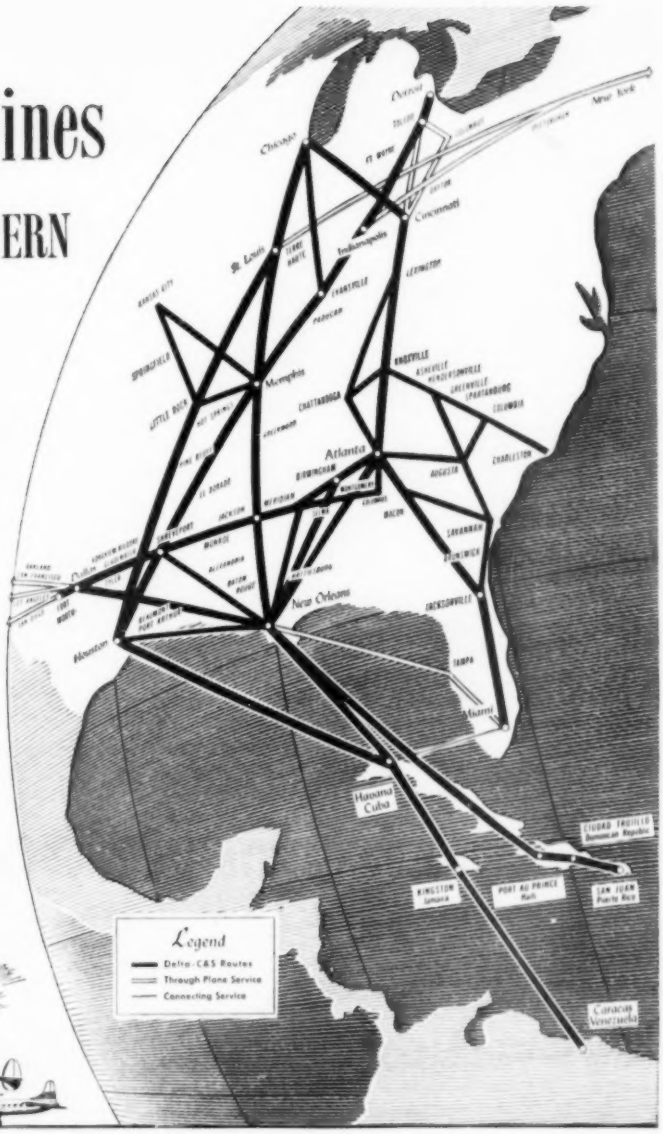
CONTINENTAL
Serving the Oil and Gas Industries

Two pioneer airlines

DELTA and CHICAGO & SOUTHERN

Merge

to serve you better



Delta Air Lines, Inc., Operating as

Delta-C&S AIR LINES

Two great pioneer airlines now are one. Delta, with 24 years of experience in serving the South and linking it with the Midwest, joins with Chicago & Southern which has served the Mississippi Valley for 19 years and also ties Mid-America to the West Indies and South America.

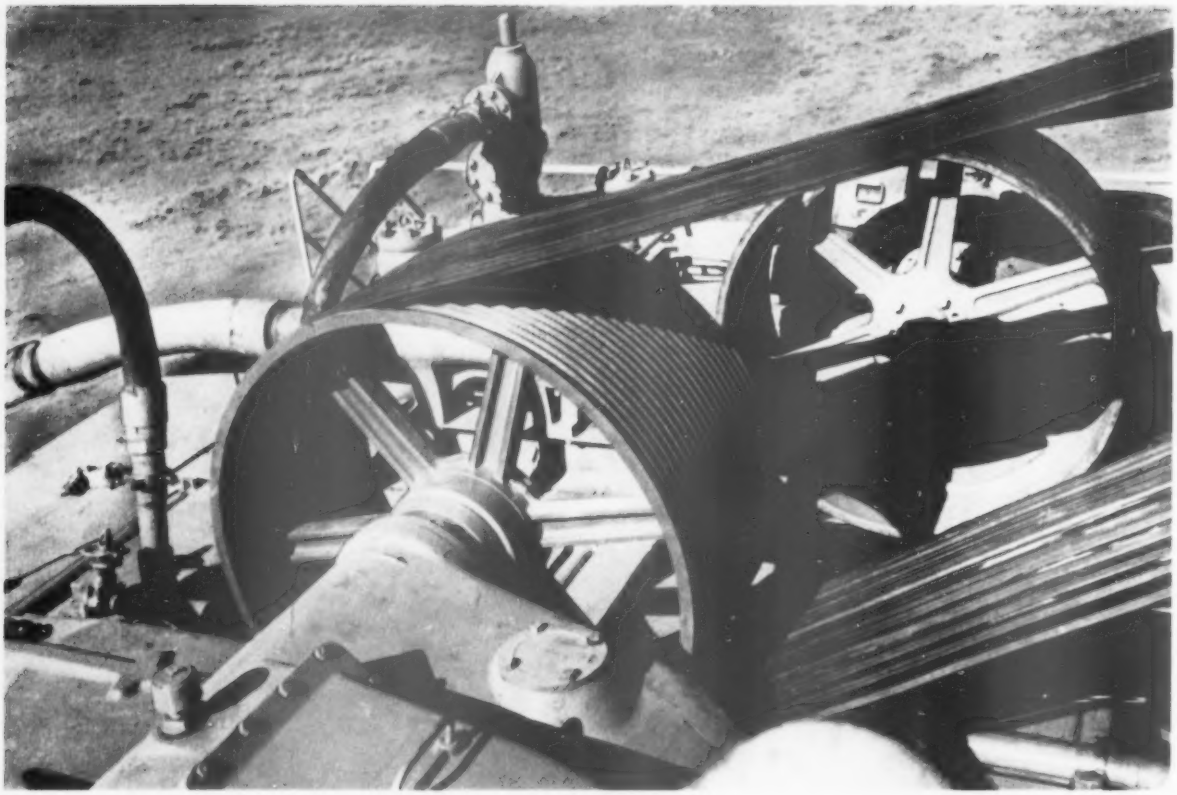
This merger is one of top management and line personnel, as well as routes, and the public will gain from the combination of talent and facilities. Approved by the Civil Aeronautics Board and the President of the United States, it has now been ratified by the stockholders of each line. Operation as one company, Delta-C&S Air Lines, is now in effect. For the immediate present, however, flight schedules will be unaffected on both systems.

On the basis of current passenger-mile figures, the new company will be the fifth largest domestic airline, serving nearly 25,000,000 people directly in 55 U.S. metropolitan areas and 20,000,000 more in 6 Caribbean countries.

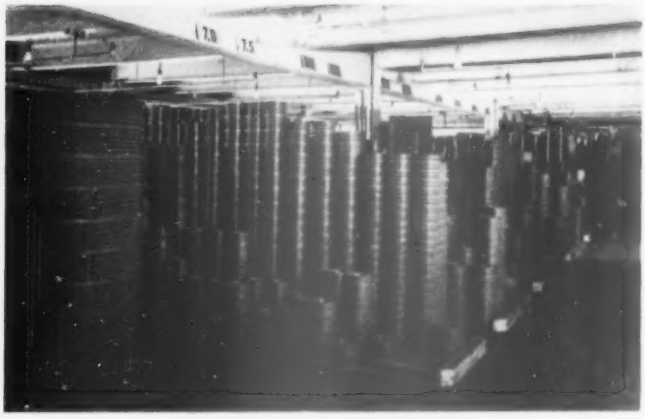
The merged airline intends to maintain the reputations earned by the two individual companies for friendly, hospitable service with modern, luxurious equipment.

LINKING 61 CITIES IN THE U.S. AND CARIBBEAN

GENERAL OFFICES: ATLANTA, GEORGIA



How much do sheave troubles cut your production time?



YOU DON'T HAVE TO WAIT for delivery of Worthington sheaves. Local distributors in all oil field areas are well stocked with most sizes. And they're backed up by factory stocks in Los Angeles, Fort Worth, Houston, Tulsa, and New Orleans.

Sheaves can be headaches.

If they're made with solid hub and bored for tight fit on the shaft, they're tough to get off. As a result, valuable production time is wasted during removal for shaft maintenance.

If they're built with solid hub and loose bore for quick, easy removal, they often don't hold the shaft tight enough to withstand heavy shock loads without slipping. Again you lose production time.

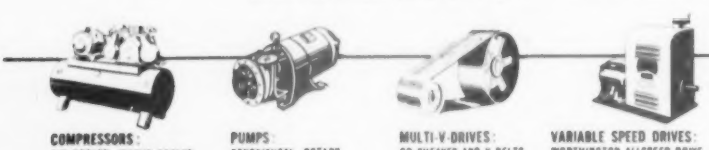
Not so with the Worthington QD! This sheave was especially designed to meet the demands of oil-production men. Its unique two-piece construction makes it easy to get on, easy to get off. But its heavy-duty, taper cone friction grip hugs the shaft tight, even against the heaviest shock loads.

It'll pay you to standardize on the Worthington QD*. Worthington Corporation, Oil City, Pennsylvania.

* Reg. U. S. Pat. Off.

Visit the Worthington Exhibit Building, corner Mid-Continent and Oklahoma Drives, Tulsa Oil Show

MV.3.6



COMPRESSORS: AIR-COOLED, WATER-COOLED

PUMPS: CENTRIFUGAL, ROTARY, STEAM, POWER

MULTI-V-DRIVES: QD SHEAVES AND V-BELTS

VARIABLE SPEED DRIVES: WORTHINGTON ALLSPEED DRIVE

WORTHINGTON

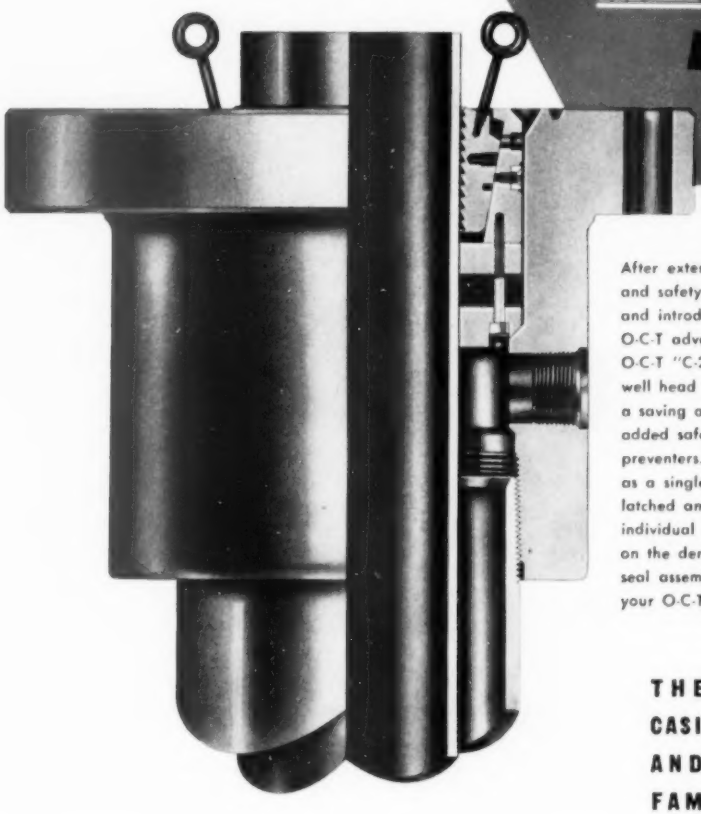
Mechanical Power Transmission

Buy these Worthington standard products from your local distributor

O-C-T "C-20" CASING HEADS

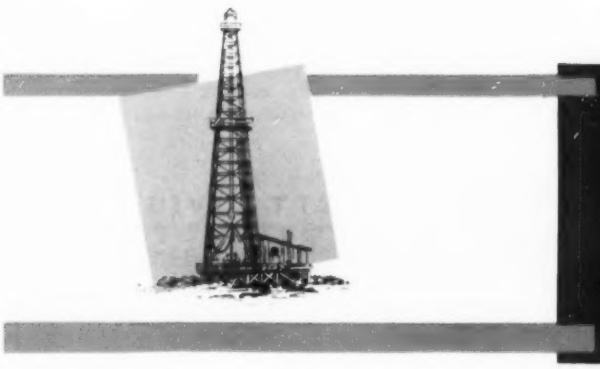
THE FIRST QUICK-SETTING POSITIVE-SEALING WELL HEADS DESIGNED ESPECIALLY TO ELIMINATE OPEN HOLE HAZARDS IN MEDIUM DEPTH WELLS

THE NEW



After extensive research and study about casing head flexibility and safety for medium depth wells, Oil Center Tool Co. has developed and introduced the new "C-20" casing head. Combining field-proved O-C-T advantages with modern engineering techniques, the O-C-T "C-20" gives operators the first quick-setting, positive-sealing well head for medium depths. In addition, the new design means a saving of costly rig time with simplified installation and added safety in the completion operation before removing blowout preventers. The sealing element, slip bowl and slips are assembled as a single unit that may be wrapped quickly around the casing, latched and dropped into place, eliminating the possibility of individual parts being installed incorrectly. All work can be done on the derrick floor without entering cellar to install slips and seal assembly. Write for complete information or contact your O-C-T Representative.

THE OUTSTANDING NEW O-C-T CASING HEAD HAS ALL THE FEATURES AND FLEXIBILITY OF THE WORLD-FAMOUS O-C-T "C-19" CASING HEAD



Oil Center Tool Co.

P. O. BOX 3091 • HOUSTON, TEXAS

Export Representatives: Sterling Areas — Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England.

Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston 1, Texas

When everything's right . . . you roll!

These "boom cats" are lowering a completed pipeline into its permanent location after which backfilling the trench is begun . . . the final steps on a job that rolled along smoothly, because everything was right . . . from the start.

This pipe has been given complete protection with Barrett coal-tar enamel and Barrett asbestos coal-tar saturated pipeline felt. And to make certain that this complete protection against climate, corrosion and soil would be applied right all along the line, a Barrett technical advisor was on the job from the beginning.

With Barrett, you not only have the finest protective coating, but also the advice and assistance of Barrett's Technical Service Corps. These trained experts are paid by Barrett to work with you. They start at the planning stage by helping to determine the best protective coating to meet your specific requirements, and follow the construction of your pipeline until it is safely underground. They are your guarantee that costly pipe will get superior protection.

Barrett maintains field offices throughout the country to provide best materials and the best service . . . for the best in pipeline protection at the lowest cost. For any pipeline coating problem, be sure to consult Barrett — write, wire or phone for detailed information.

Barrett® BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
Allied Chemical
40 RECTOR STREET, NEW YORK 6, N. Y.

In Canada: The Barrett Company, Ltd., 5551 St. Hubert St., Montreal

®Reg. U. S. Pat. Off.

Corrosion increases your... ...lifting costs $

Typical example of sucker rod failure due to corrosion. This rod was pulled from a well in the Toborg Field near Iraan, Texas.

NOCOR
CORROSION INHIBITOR

Would you spend a nickel to save a dollar? New Nocor "102" has proven as much as 98.8% effective against even the most highly corrosive wells. The small cost of Nocor "102" saves the waste of expensive workover jobs time and time again. Some wells, formerly shut down at least once a week for pulling jobs brought about by corrosion have — since Nocor treatment began — operated continuously without shutdown.

Get the inhibitor of proven effectiveness, Nocor "102" — another product of Cardinal's unending research to make good things even better.

Price $1.50 per gallon f.o.b. Odessa, Texas

Write for representative nearest you . . .

CARDINAL CHEMICAL · INC.

HOME OFFICE ● ODESSA, TEXAS ● BOX 2049

PULL A VACUUM AND SWAB THE WELL CLEAN

with GUIBERSON GW CUPS

GW Cups Assembled on famous Guiberson K Swab

Save time . . . save money . . . save *fluid* . . . with GW cups . . . with K Swabs — products of Guiberson's more than a third century's experience serving the oil industry.

If you want to *swab*—not just agitate—flexible Guiberson GW cups on the Type K Swab will pull every drop. They hug the casing wall — provide automatic seal and controlled pipe contact — pull a vacuum and clean the well!

Precision molded in Guiberson's own rubber plant from special abrasion resistant compound, GW cups take up their own wear. Made up on the K Swab, they are unexcelled in rough or mixed casing strings — for unloading shallow wells. Won't down-swab or hang on casing collars. Interchangeable on famous K Swab.

GUIBERSON

THE GUIBERSON CORPORATION

ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.

Sold By Leading Oil Field Supply Stores Everywhere

They Say—

Lower-Production Prospect

"Further cuts in domestic production will be necessary during coming months unless imports are restricted.

"This will mean less income to the domestic industry, less drilling, less reserves developed, less productive capacity, and—in short—less national security as to petroleum."

H. B. Fell, executive vice president, Independent Petroleum Association of America, speaking in Abilene, Tex.

No Panic Over Peace

"If they keep up the air force, the number of ships, and the standing army to much the extent we have it now, peace wouldn't affect our business too much. If we stretch out our rearmament program, which is probable, again the oil industry would not be affected as much as the airplane builders.

"An end to the war would slow up exploration and the amount of money spent on expansion, but that has already started. In the past 6 months the oil supply has caught up with demand, despite a 5 per cent increase in demand during the first 3 months of this year. The number of wells drilled would be cut back."

Dean A. McGee, executive vice president, Kerr-McGee Oil Industries, Inc., speaking in Oklahoma City.

Regardless of Adjustments . . .

"Lest there be any doubt in anyone's mind, the oil industry, like other industry, welcomes any sincere move toward peace, regardless of any adjustments which might have to be made."

Dr. Robert E. Wilson, chairman of the board, Standard Oil Co. (Ind.), addressing the annual stockholders meeting, Hammond, Ind.

Economics of Safety

"Every man whose occupation makes him a part of the American Petroleum industry may feel that his efforts are contributing to the security and prosperity of America as well as being a means of earning a livelihood.

"Of particular service are those who labor for an improved safety program in the oil industry because they are serving both to reduce loss of life and human suffering and to decrease the tremendous cost of accidents to the industry.

"Improved efficiency in the oil in-

. . . NEW Heat Saving Efficiency

MUNDET 85% MAGNESIA INSULATION provides maximum strength and resistance to vibration. Extra durability is built into this insulation. In pipe covering and blocks, it is precision manufactured on the latest type of automatic equipment to insure uniform standards. It does not "powder", settle or disintegrate. It is unaffected by steam or water leakage. It maintains an attractive, smooth finish. Precision pipe fit is assured, with no spaces left for the escape of heat. You benefit from the most modern manufacturing facilities for the production of heat insulation when you specify Mundet 85% Magnesia Pipe Covering and Blocks.

Write for new heat insulation Engineering & Specifications Data Manual.

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NEW ORLEANS 16 315-25 N. Front St.
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Chlorination equipment because it controls slime that *grows* on the walls of condenser tubes not protected against it. Enough of the growth eventually seriously reduces heat transfer efficiency — actually *insulates* your steam from the cooling water. Back pressures go up, production drops, operating and maintenance costs rise, and eventual shut-down becomes necessary for regular clean-out periods.

Wallace & Tiernan equipment because it is versatile, sturdy and dependable — proven by thousands of successful installations, vouched for by satisfied users everywhere-and because there's a Wallace & Tiernan chlorinator for every job. Write today for information on how Wallace & Tiernan chlorination may help you solve *your* slime problem.

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regardless of the source. Chlorination helps reduce slime in process or cooling water.

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CHLORINE AND CHEMICAL CONTROL EQUIPMENT
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dustry is essential to offset the steadily increasing cost of finding and developing oil reserves if, with its limited income, the industry is to achieve the near-miracle of further increasing productive capacity.

"Since accident cost, as evidenced by insurance rates, is one of the largest items of expense in developing, producing, and refining oil, a safety program offers a very promising area for reducing cost."

William J. Murray, member, Texas Railroad Commission, addressing the sixth midyear meeting of the Safety and Fire Protection Committees, American Petroleum Institute.

Back to the States

"The purpose of the tidelands bill previously voted by the House and now by the Senate is simply the restoration of state claims to the submerged areas that had been recognized for 150 years.

"This legislation therefore is neither a 'give-away' program nor a 'grab' proposition as the filibuster element in the Senate attempted to show. In a large way that element was speaking for the fair deal program and the effort to extend federal power and control. If there was any 'grab' in the transaction it was here.

"In this whole affair as in other present moves, the basic issue has been restoring the long established balance between federal and state authority. Under the new and fair deals of the last twenty years the pendulum had swung far toward federal control and highly centralized power. Now it is swinging back toward a safe equilibrium and without any give-away or grabbing procedure."

Editorial in the Kansas City Times.

Doubtful Benefits

"When Congress gets to writing specific tariff rates and barriers to foreign imports, it gets into the logrolling business.

"All the groups seeking special 'protection' for themselves promote each other's interests. But the net of it is that each is concerned solely with its own purse.

"The result of this kind of legislating ignores the general welfare. In the long run, even the 'benefits' for the few become of doubtful value.

"By contrast, the reciprocal trade program is an over-all policy, taking a broad view of the problem—which is the general trade and the economic wellbeing of the country as a whole.

"President Eisenhower has asked Congress to extend this general policy for one year—while the whole question is reviewed in the light of today's

. . . of world-wide geophysical engineering experience go into every job we undertake.

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GEOPHYSICAL ENGINEERING COMPANY

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SEISMIC • GRAVITY • MAGNETIC SURVEYS

the dream of Oliver Grebe

Oliver Grebe was an important guy
the head of a drilling crew,
but he was as nervous as a fly
and was always in a stew.

He kept his men all upset
and worried all the time,
about the problems to be met
he would cuss and whine.

Now after a wild and wooly day
when Grebe was especially bad,
he went home to hit the hay
and left his crew all mad.

He cursed the day that he was born,
and at his boarding house
he gave the landlady a look of scorn
said she, "He certainly is a louse."

This particular night he went to bed
and had an unusual dream,
he saw himself all stretched out dead,
and there was his drilling team.

All dressed up in their Sunday best
and singing this joyful song,
"Old Oliver Grebe is dead—the pest
will no longer do us wrong.

If he had only inquired of us
we'd have solved his problems easy.
We know that there's no need to fuss
when the rig is running wheezy.

Just look no further than United Supply
Their stores are not far away . . .
rig problems to them are easy as pie
they reduce down time and delay."

Oliver Grebe woke up with a start
he was shaking like a leaf,
"Say, I haven't been very smart
to cause my crew this grief.

On United Supply I'll always rely,
they'll handle all my trouble—
Whenever the old rig starts going awry
we'll get repair parts on the double.

Now Oliver Grebe is a different man
He's loved by everyone,
The kids all call him Superman
His crew thinks he's A-1.

You see, he's found out about United
and how they deliver fast,
and that no one is ever slighted—
It's a service unsurpassed.

YOU CAN RELY ON UNITED SUPPLY!
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COURTESY • SERVICE • DEPENDABILITY

UNITED SUPPLY

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COURTESY • SERVICE • DEPENDABILITY

conditions, economic, political and military. For all are interlocked.

"But there is pressure in Congress to cripple this policy by imposing restrictions on the import of specific commodities which are held to compete with domestic products. Fuel oil, for instance.

"The coal industry is in a serious economic slump. It needs help. Mostly it needs leadership. It has lost much of its market, a great deal of it to fuel oil. So, presto! The cure for this, as now proposed in Congress, is to cut to a fifth the import of fuel oil.

"The inevitable consequence of that would be to scoot the price of fuel oil out of sight. It would be so scarce that many users, almost all of whom are on the East Coast, might not be able to get it at all.

"Would this help coal? Not much. Most of the fuel oil users are not equipped to convert to coal.

"The result would be that whatever coal would gain, if anything, would be far offset by injury to consumers.

"Is that what Congress wants to do?"

Editorial in the New York World-Telegram.

CALENDAR

MAY

25-28 Air Pollution Control Association, annual meeting, Lord Baltimore Hotel, Baltimore, Md.

25-29 American Society of Mechanical Engineers, annual conference and exhibit, oil and gas power division, Hotel Schroeder, Milwaukee.

27-29 Texas College of Arts and Industries, Kingsville, eighth annual short course in gas technology.

28-29 Western Petroleum Refiners Association, regional technical-industrial relations meeting, Broadview Hotel, Wichita.

28-29 Natural Gas and Petroleum Association of Canada, London, Ont.

29-30 West Texas Geological Society spring field trip, Paisano Hotel, Marfa, Tex.

JUNE

2- 3 American Petroleum Institute, Division of Production, Pacific Coast District, Statler Hotel, Los Angeles.

4- 5 Kentucky Oil and Gas Association, annual meeting, Lafayette Hotel, Lexington, Ky.

7-12 Society of Automotive Engineers, summer meeting, The Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.

14-18 Canadian Gas Association, Windsor Hotel, Montreal, Canada.

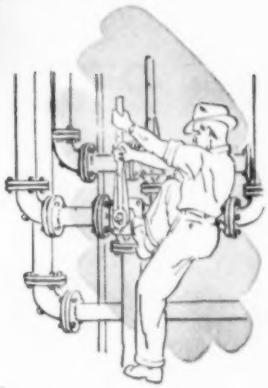
15-19 American Association for the Advancement of Science, petroleum conference, Colby Junior College, New London, N. H.

15-19 American Institute of Electrical Engineers, summer general meeting, Chalfonte-Haddon Hall, Atlantic City.

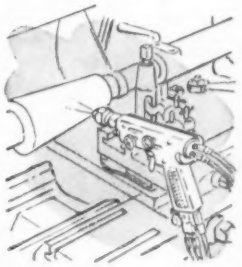
15-19 American Petroleum Institute, Division of Production, midyear committee conference, Hotel William Penn, Pittsburgh.

16-19 American Welding Society, national

VALVES WON'T STICK



With Colmonoy Hard-Facing



Valves stick because the metal to metal contact between plug and body causes galling. Galling occurs because the metal used in corrosion resistant valves is relatively soft. These troublesome valves can be made to work easily by hard-facing the plugs and seats with a COLMONOY alloy. COLMONOY is inherently hard, and has a *low coefficient of friction*, which gives it *high galling resistance*. It also has *excellent corrosion resistance*, making it the perfect material for these applications.

COLMONOY alloys may be applied to the plugs in two ways. Oxy-acetylene rod application can be done by any welder. With a COLMONOY Spraywelder, powdered COLMONOY is sprayed on and then fused, forming a smooth overlay. Sprayed overlays require but a fraction of the usual finishing time. Both methods are quick and easy, give long, smooth-turning valve service.

When you order new valves—

Valves used under corrosive conditions have been made mostly from integral castings of some good corrosion resistant alloy. Now COLMONOY alloys, much harder and more resistant to corrosion, are being welded to the fluid contact surfaces of valves made from strong but inexpensive carbon steel. The result is a stronger, freer working valve with higher, all-around corrosion resistance, and the ability to stand 1000° F. service. Specify COLMONOY hard-faced steel valves for the best and longest anti-corrosion service possible.

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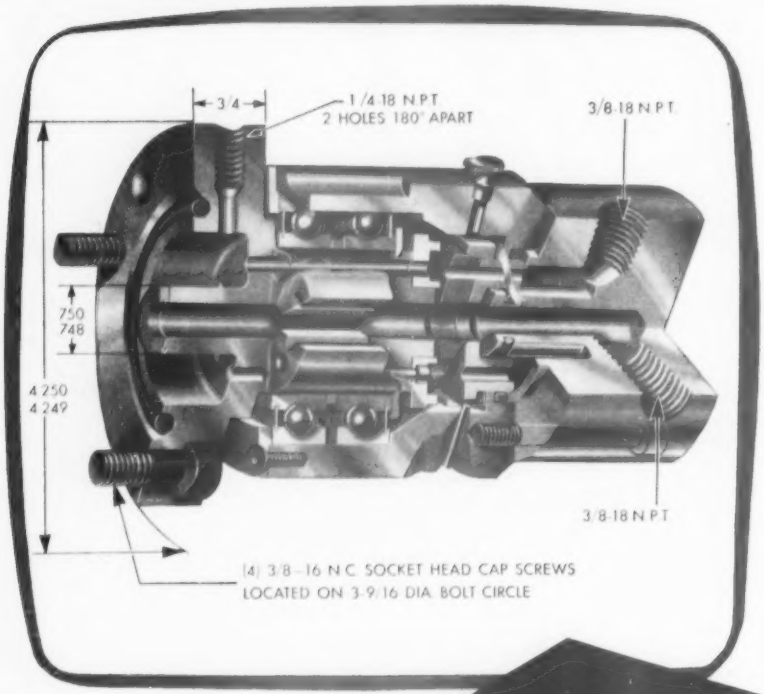

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Now Deublin engineers bring you this new Model 1500 Deu-Plex—a precision-built double rotating union designed to convey air to two clutches mounted on the same shaft.

In every detail this timely development reflects Deublin's experience in solving rotating sealing problems since 1945. It's interchangeable with your present equipment. It's packed with advanced performance advantages for long, trouble-free service.

Ask your local supply store for details on the new Deublin Deu-Plex Union. Also get the facts on dependable Deublin single rotating air unions and the Deublin *chatter-proof* Quick-Release Valve.

The Performance YOU Want!

★ **INTERCHANGEABLE**—Model 1500 is interchangeable with your present double rotating unions.

★ **LEAKPROOF AIR SEAL**—Lapped Meehanite seal face running against a lapped carbon for most dependable sealing. Both seal faces lapped to 3 millionths of an inch surface finish.

★ **NEW BALANCED SEALING**—Air is balanced within the unit so line pressure cannot increase load on seal faces, thus increasing seal life.

★ **MINIMUM TORQUE**—Starting and running torque held to constant minimum through balanced sealing and 2 single-row, sealed-for-life ball bearings. Permits higher operating speeds.

★ **DURABLE CONSTRUCTION**—Light weight, yet built for long, trouble-free service.

★ **OPERATING DATA**—Maximum speed, 3500 r.p.m. Maximum pressure, 150 p.s.i.

DEUBLIN COMPANY

Precision Products for the Petroleum Industry

1155 Waukegan Road, Glenview, Illinois

spring technical meeting, Shamrock Hotel, Houston.

JUNE 16-JULY 2 Intensive Course and Research Conference on Phase Behavior of the Hydrocarbons, University of Michigan, College of Engineering, Ann Arbor.

18-19 Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh.

18-19 Western Petroleum Refiners Association, regional technical-industrial relations meeting, Conrad Hilton Hotel, Chicago.

18-20 National Society of Professional Engineers, annual meeting, Sheraton-Beach Hotel, Daytona Beach, Fla.

24-27 Intermountain Association of Petroleum Geologists, fourth annual field conference, Ben Lomond Hotel, Ogden, Utah.

June 28-July 2 Petroleum Equipment Suppliers Association, annual meeting, Broadmoor Hotel, Colorado Springs, Colo.

JUNE 29-JULY 3 American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

JULY

July 30-Aug. 1 Wyoming Geological Association, eighth annual field conference, University of Wyoming, Laramie.

AUG.

17-19 Society of Automotive Engineers, international West Coast meeting, Georgia Hotel, Vancouver, B. C., Canada.

18-21 American Institute of Electrical Engineers, Vancouver Hotel, Vancouver, B. C.

24-26 Appalachian Gas Measurement Short Course, West Virginia University, Morgantown, Va.

SEPT.

6-11 American Chemical Society, national meeting, Conrad Hilton Hotel, Chicago.

9-11 Pacific Coast Gas Association, San Francisco.

11-12 Association of Desk and Derrick Clubs of North America, annual meeting, Cosmopolitan Hotel, Denver.

13-16 American Institute of Chemical Engineers, Fairmont and Mark Hopkins Hotels, San Francisco.

15-16 American Petroleum Institute, executive committee, Greenbrier Hotel, White Sulphur Springs, W. Va.

16-18 National Petroleum Association, annual meeting, Hotel Traymore, Atlantic City, N. J.

21-25 Instrument Society of America, national instrument conference and exhibit, Sherman and Morrison hotels, Chicago.

24-25 Western Petroleum Refiners Association, regional meeting, Henning Hotel, Casper.

27-30 American Society of Mechanical Engineers, annual conference, petroleum division, Rice Hotel, Houston.

28-29 Independent Natural Gas Association of America, Shamrock Hotel, Houston.

Sept. 30-Oct. 2 American Association of Petroleum Geologists, Mid-Continent regional meeting, Masonic Building, Wichita.

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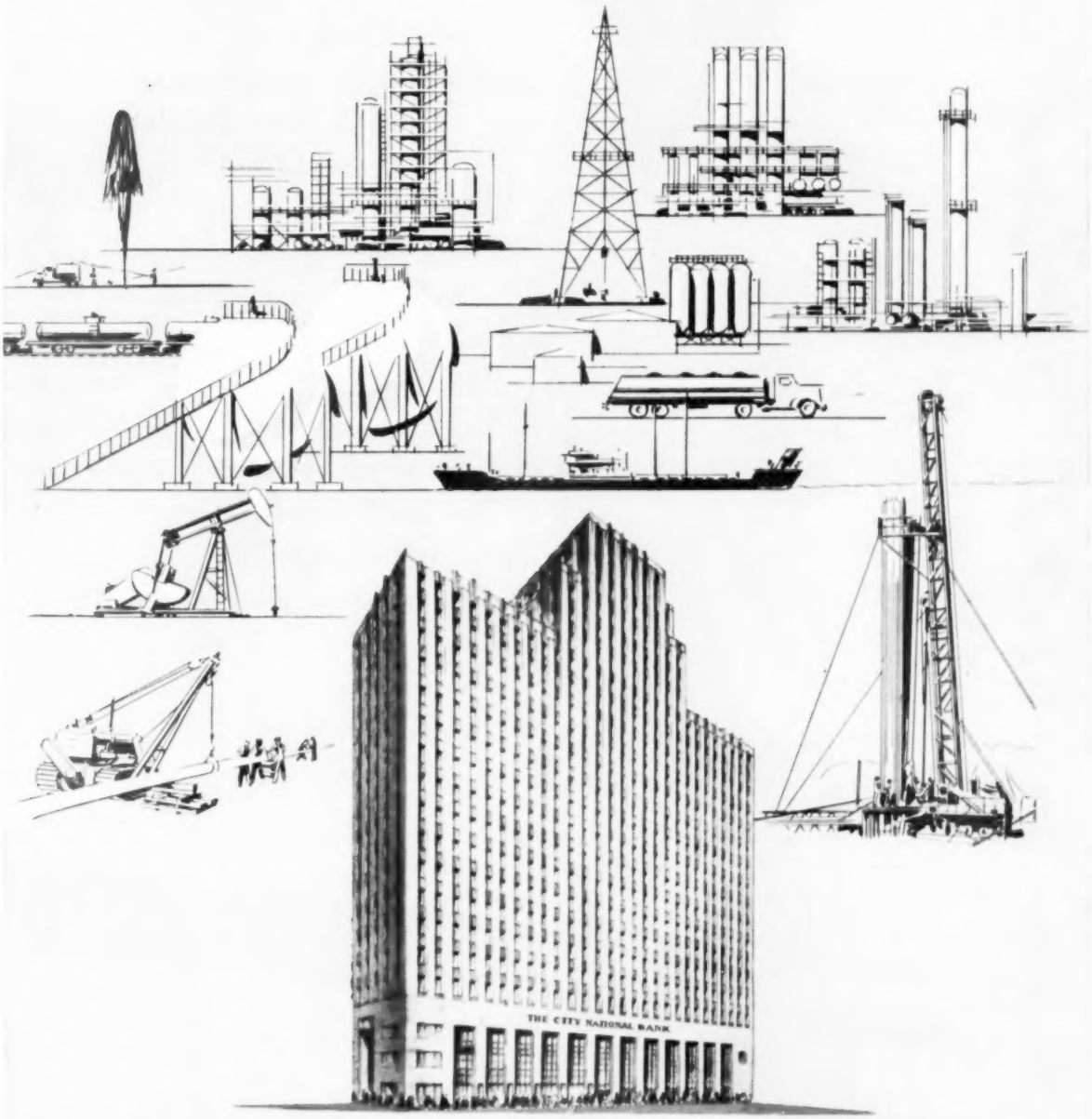

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"Y'know...the man's right!"

"Joe, the Lane-Wells man, I mean. Sometime back, he was urging me to try Lane-Wells packers. So I said, 'Why should I?' 'Because they'll give you better service,' he says. 'Why?' I said. 'Give me a reason.' Easy!' he comes back. 'Because oil-country men design 'em and build 'em to do the job the way you fellows want it. They run in easily, they set right where you want 'em, they give you leak-proof packoff just as long as you need it, they release without a struggle, and come out ready for more.'

"Well, he went on, giving me construction details and a raft of information. The upshot was, I tried some. Then I got some more. The man's right!"

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THE OIL AND GAS
JOURNAL
TULSA, OKLAHOMA

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JOURNALLY Speaking

It Just Shows to Go

WHEW, we're glad it's over. The Oil Show we mean. And we'll bet the feeling is shared by everyone connected with it except possibly the Tulsa taxi drivers, restaurateurs, and sub rosa purveyors of potable elixirs.

It was wonderful, but 10 days of it was hard on the feet and legs and disruptive of normal routines. Elsewhere in this issue are reports of some of the activities and of the industry significance of the new developments in equipment, but what impressed us the most was how the I.P.E. was the reunion of acquaintances from all over the world. Oil is a fraternity as well as a business, and shaking hands with old friends seemed to be as important and as gratifying as learning about the industry's technological advances.

Now the show is over and the elaborate displays are being dismantled and weary exhibitors and visitors are on their way home. Was it worth it? We think so. Not just in equipment sold and contacts made and education gained, but in the fortified feeling that oil is a throbbing, dynamic, progressive, friendly, and mighty fine industry to be a part of.

Show of Shows

AT one of the functions which Oklahoma newspapers (out of deference to our state constitution) charitably describe as an hors d'oeuvre party, we got well acquainted with a man who has no connection with the oil industry, equipment manufacturers, nor the city of Tulsa, but whose job involves attending trade shows, industrial expositions, and equipment exhibits all over the country.

After both of us had been subjected to a couple of slugs of "truth serum," we asked him if he would tell us off the record, man to man, and straight from the shoulder, how our Oil Show compares with others of similar nature in other industries.

He looked surprised, and said: "Why, there's no comparison. This is terrific. There's nothing like it in the world. No other show has anywhere near so much stuff on display, such a wide variety and diversity of equipment, or so much money involved. I've never seen anything like it in my life." We were much pleased to get this unvarnished opinion from an impartial expert.

The Show Must Go On

BEING just a country boy and small-town editor, we couldn't absorb much of the technical intricacies of most of the equipment exhibits at the Oil Show, so we left that phase of it to our official staff experts and spent our time trying to get the personal reactions of a lot of exhibitors.

What we learned will probably get us forever barred from the Tulsa Boosters' Club, but our devotion to Truth forces us to record it. There was a smattering of feeling that the I.P.E. has become too big for the city of Tulsa, that is, too big for Tulsa's physical facilities to handle such crowds; a case where the spirit is willing but the flesh is weak.

However, there was no agreement on what might be done about it. Some felt that if the Oil Show is to be continued as an industry-wide, international exposition, it should by rights be held in some city at least 10 times the size of Tulsa, but they doubted that, as a practical matter, the show's site could ever be moved after having been here for 30 years.

Others thought that the industry has become too big for a single show any place, and its equipment displays should be broken up into a series of smaller but more frequent regional or industry-division shows. But others thought that this would invite a rat race of competition among ambitious chambers of commerce with the result that there would be a dozen shows every year. But practically everybody agreed that the show must go on in some form, some place, and—weary as they were at the moment—most of the exhibitors allowed that they'd be on hand whenever and wherever.

The views expressed here are not necessarily those of this publication but are recorded as a matter of information and impartial reporting.

Henry D. Ralph

YOU CAN SAVE CASING

BY STAGE CEMENTING THE BAKER WAY

With *only one* string of casing you can cement off at the shoe *and* shut off surface water. Or you can cement a well with *two producing zones* and be assured of a good cement job for the upper zone. And you *never* need risk breaking down a comparatively weak formation by high cementing pressure and the extreme weight of a long cement column.

IT'S SIMPLE, SPEEDY AND SAFE to perform two-stage cement jobs with Baker Stage Cementing Collars (Product No. 200-F) in combination with other Baker Equipment. In addition to positive, mechanical closing of the cementing ports upon completion of the second stage, you are assured of these outstanding advantages:

1. After the second stage has been completed, an external steel sleeve with an oil-resistant synthetic rubber seal provides positive closure and prevents passage of fluid between the inside and the outside of the casing, regardless of the condition of the cement job at that point.

BAKER STAGE CEMENTING COLLAR

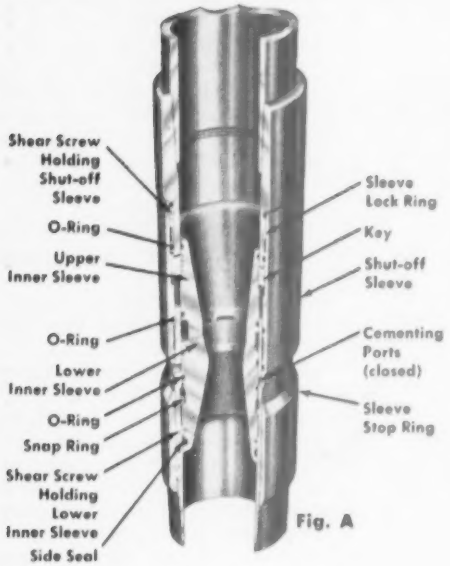

Fig. A

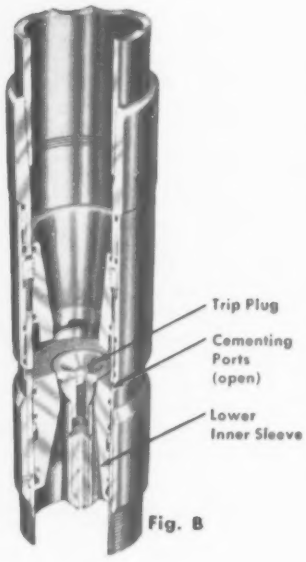

Fig. B

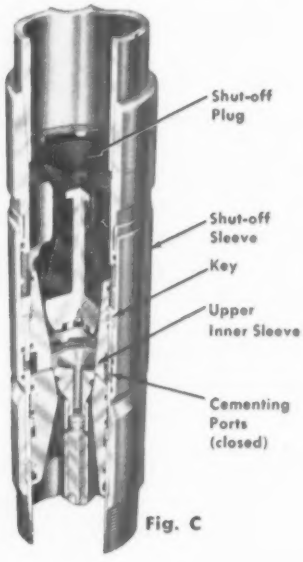

Fig. C

Fig. A—Ready for cementing the first stage. The cementing ports are covered by the Lower Inner Sleeve which is held in position by shear screws; shear screws also hold the Shut-Off Sleeve above the cementing ports.

FIG. B—Ready for cementing the second stage. After the Trip Plug is seated, application of hydraulic pressure shears the screws holding the Lower Inner Sleeve which moves downward, thus uncovering the cementing ports. The Trip Plug prevents passage of fluid into the casing below, and cement pumped into the casing will now pass through the cementing ports for the second-stage cementation.

FIG. C—Second-stage cementation is completed. The Shut-Off Plug has been pumped down the casing and pressure applied to shear the screws and move the Shut-Off Sleeve downward to close off the cementing ports. Note how the Sleeve Lock Ring has expanded to lock the Shut-Off Sleeve in position permanently covering the cementing ports.

2. The cementing ports of the Stage Cementing Collar may be opened at any time after completion of the first stage, and fluid may be circulated through the stage collar for any desired length of time before starting second-stage cementing.
3. Operation of the stage collar is effected by fluid pressure applications only, and no movement of the casing is required after the first stage of the cementation has been completed.
4. All internal parts of the Baker Stage Cementing Collar are constructed of readily drillable materials, and when drilled out there are no sharp shoulders or irregularities to interfere with the subsequent passage of tools through the collar.
5. Since the steel Shut-off Sleeve is on the outside of the Stage Cementing Collar, there is no possibility of accidentally opening the cementing ports when drilling out the internal mechanism, or later when bits or casing scrapers are run through the collar.

Ask any Baker representative or office for recommendations to make your stage cementing operations successful, "first-time" accomplishments.

BAKER OIL TOOLS, INC.

HOUSTON • LOS ANGELES • NEW YORK

Let's have another Oil Show

THE International Petroleum Exposition should be repeated in Tulsa every few years. This is the considered opinion of this publication, based on the reactions of scores of exhibitors.

During the planning for this year's oil show there was considerable grumbling over the trouble and expense. Some said this might be the last big oil show; that the industry has grown too big for a single exhibit.

BUT after talking with literally scores of exhibitors we are convinced that the I.P.E. should be repeated on substantially its 1953 pattern.

When? In 3 or 4 or 5 years, depending on conditions in the industry and the pace of technological advances in equipment.

Where? In Tulsa, where it has been for 30 years and where there is investment in a permanent site and organization. Only a very few of the country's largest cities could house and service the oil show without some strain, and there the show would be out of the oil country and would be lost and ignored.

Of course there were complaints and gripes. A few restaurants and contractors doubled their prices; there were some jurisdictional disputes with labor unions; parking was a problem. But these troubles would be just as bad anywhere else, if not worse.

The large number of kids and townspeople annoyed some exhibitors, but most were quite tolerant. Everyone wants to see a show, and as a part of the oil industry the exhibitors have some obligation to help educate the public. And in an oil town a lot of the youngsters are sons of oil men or will be oil men some day.

There were plenty of real oil men present, from the top echelons down through the operating levels, and they showed a gratifying interest in the displays. Almost all the exhibitors were well pleased with the number and character of their visitors and with the contacts made with customers and prospective purchasers.

To divide the show into segments, either geographically or by industry divisions, would be a mistake. This would lose the national and international aspect of the I.P.E. and would ignore the fact that technology advances across the entire industry and that many manufacturers serve all its branches.

THE industry needs one big equipment exhibition every few years. It is educational for oil men and for the general public. It stimulates competition and progress among suppliers and users of equipment. It brings the entire industry up to date on the advance of technology. It promotes the use of new equipment, without which the industry would become static or decadent. It is worth while.

Let's plan on another International Petroleum Exposition in Tulsa a short few years hence.

A Big Job

NEEDS THE RIGHT EQUIPMENT

● Drilling an oil well is a big job...particularly when footage runs miles deep. Takes the right kind of rig...with skilled, experienced men to handle all operations.

Making quality cement is a big job, too—demanding the best in equipment and personnel. Size of the operation is suggested by the cement kilns—great steel cylinders, some as long as 400′ by 11′-6″ diameter. Here, high-grade raw materials, exactly proportioned to assure the required properties in performance, are fused and combined into finished cements to meet the wide range of exacting oil-field service.

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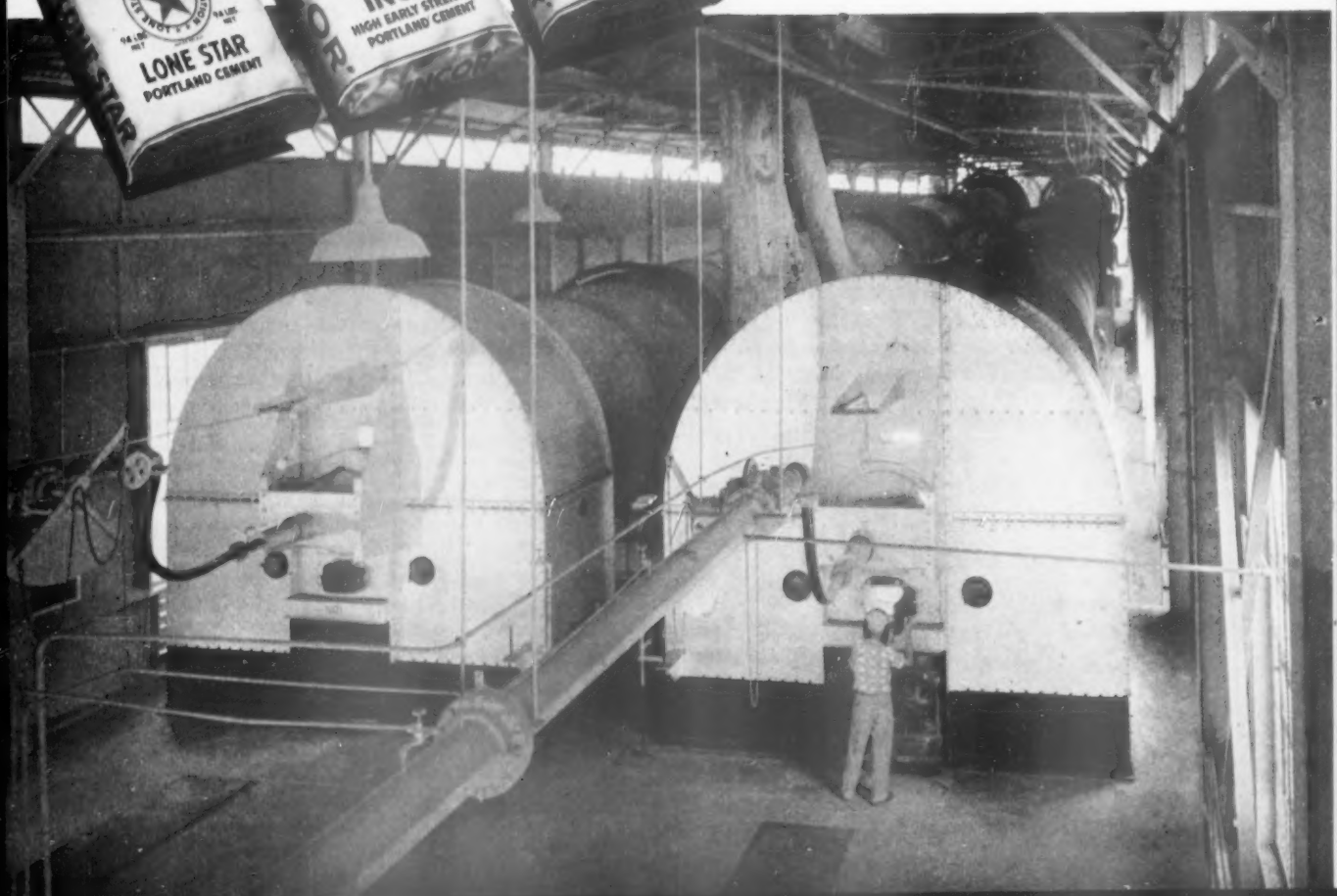


THIS WEEK

CULTURE AT THE OIL SHOW was provided by Tulsa Philharmonic orchestra, shown here in a night shot, with each of the musicians properly equipped with safety hats in keeping with the atmosphere of the surroundings.

EXPOSITION.—World's biggest oil-industry equipment show draws to a close after a 10-day run which saw all previous records broken. . . . Attendance average of 40,000 daily recorded by officials. . . . About 800 visitors from outside the United States registered during show. . . . Latest in methods and equipment for fields and plants seen by record number of domestic oil men. . . . Officials announce tentative plans for another oil show in "4 or 5 years." . . .

INTERNATIONAL.—Japanese tanker picks up second cargo of Iranian oil for unaffiliated Idemitsu Kosan company. . . . Company continues to buy the nationalized oil despite Japanese Government opposition and the filing by Anglo-Iranian Oil Co., Ltd., of an ownership suit against its first such purchase. . . . Venezuelan Petroleum announces new oil discovery in the State of Barinas, southwestern Venezuela. . . . Wildcat reported testing 312 bbl. daily of 27.5 -gravity crude from sand at 9,140 ft. . . . Yacimientos Petroliferos Fiscales reports new oil-field discovery in Salta Province near the Bolivian border in Argentina. . . .

REFINING.—Sunray Oil Corp. plans coking unit at Duncan refinery with capacity of 6,000 to 9,000 bbl. per day . . . Standard of Indiana announces plans for a paraxylene plant at its Whiting refinery . . . Output would be 14,000,000 lb. per year . . . Royalite Oil Co. confirms tentative earlier announcement of plans to build 5,000-bbl. refinery at Kamloops, B. C. . . . Plant will be operated by new Royalite subsidiary, will operate on Redwater crude moved through Trans Mountain pipe line . . . Most organic chemicals now marketed eventually will be made from oil, Egloff predicts . . . Next few years may see growth in number of such chemicals to 1,000,000. . . .

TRENDS.—Crude and lease condensate production in Texas will average about 2.7 per cent more in the first half of 1953 than in the same period last year, based on current estimates for May and projections for June indicated by the announced allowable. . . . About 90,000 bbl. daily of last year's production went to storage compared with an estimated 40,000 bbl. daily this year. . . .

ACTIVITY.—Production of crude and lease condensate averaged 6,330,750 bbl. daily for week ended May 16, up 1,900 bbl. daily. . . . Well completions totaled 968 for the week compared with 908 for the same week last year. . . . Wildcat completions, unchanged for the week at 232, increased 51 over last year. . . . Rotary rigs operating in the United States decreased 20 rigs for the week ended May 18 to 2,566. . . .

PIPE LINES.—Gulf Interstate Gas Co. authorized by Federal Power Commission to lay an 880-mile, 30-in. natural-gas-transmission line from Acadia Parish, Louisiana, to Boyd County, Kentucky . . . Ultimate capacity of 529,541,000 line estimated at 565,000,000 cu. ft. of gas daily . . . Standard Oil Co. (Ind.) completes and places in operation its new 309-mile, 12-in. products line from Sugar Creek, Mo., to Dubuque, Iowa . . . Capacity is 40,000 bbl. daily . . . Plantation lets contract for construction of 82 miles of 14-in. products line loop between Charlotte and Greensboro, N. C. to Anderson Brothers Corp. . . .

TYPICAL DAY at the International Petroleum Exposition in Tulsa provided arriving visitors this scene. Attendance of 40,000 daily made parking a problem for exhibitors and guests alike. Exhibits varied in size from those viewed through a microscope to complete, deep-drilling rigs. The 1953 show set records in attendance, number exhibitors, amount of equipment shown, and other aspects.

Successful Petroleum Exposition Ends

THE International Petroleum Exposition closed its 10-day exhibit of oil-industry equipment in Tulsa Saturday night with a general feeling among participants that the 1953 oil show was a big success and should be repeated in a few years.

There were suggestions that 1957 would be an appropriate date for the next exposition, but the decision rests with the I.P.E. board of directors, composed chiefly of representatives of exhibitors and oil companies, and no definite action on the question is expected for a couple of years.

Daily attendance averaged close to 40,000 on the turnstile count, about the same as in 1948 when the show ran for only 8 days.

But the percentage of oil men present was very much higher. A professional auditing firm employed by a number of the exhibitors checked visitors and classified oil men with buyer or specifier occupational titles. Preliminary figures of this audit indicated a total of 26,000 individual oil men in these categories, compared with 15,508 attending the 1948 show. Final figures and a breakdown of occupations will be available to exhibitors later.

This was confirmed by the expressions of a great many exhibitors, who declared themselves very well pleased with the number and character of the oil men visiting their displays, the interest shown, and the sales and contacts made during the show.

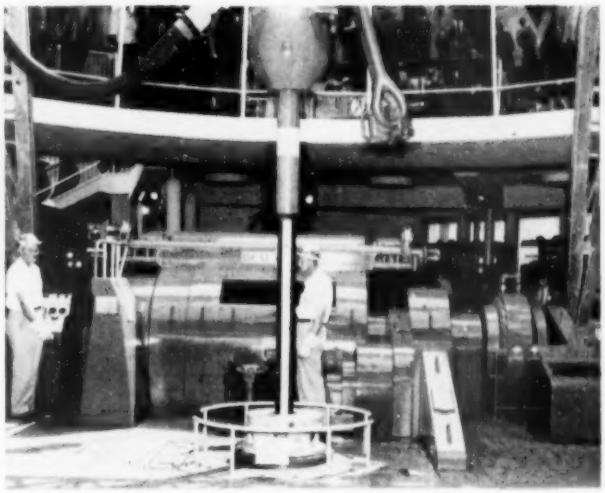
There was also an unusually large number of top executives of the oil industry present at the exposition.

Approximately 800 foreign visitors from 42 countries registered during the 10-day period. The largest delegation was from Canada, with Mexico in second place.

William B. Way, general manager of the I.P.E., declared that the success of the exposition could be attributed to the new equipment on display and the improvements in techniques which have been developed during the interval since the last oil show. He suggested that future shows be spaced at about 4-year intervals in order to keep abreast of developments and yet have plenty of new exhibits to sustain interest.

ADVERTISING REPRESENTATIVES of The Oil and Gas Journal, in Tulsa to attend the exposition and for an annual conference, were photographed on the show grounds in front of the Journal building. Left to right are Harry Becker, European representative; P. C. Lauinger, publisher; David T. Kenney, Chicago; Donald O. Hanson, Los Angeles; George O. Ruppert, Tulsa; Alfred M. Jones, Pittsburgh; John D. Reilly, Tulsa; John M. Spears, Houston; Charles A. Wardley, New York; Robert N. Caird, Jr., New York; Mitchell Tucker, vice president and advertising manager, Tulsa; and E. S. Klappenback, Chicago.

THIS BIG UNIT is designed for drilling from 10,000 to 16,000 ft. using 4½-in. drill pipe. The draw works has a net horsepower input ranging from 1,000 to 1,600 hp. and is equipped with a four-engine compound.



WITH MEDIUM-TO-DEEP drilling depth range of from 9,000 to 13,000 ft., this new draw works is shown in full operation beneath the new cantilever jackknife 140-ft. galvanized mast at the exposition. It was teamed up with two 6-cylinder gas drilling engines.

Industry Views Latest in Equipment

WHAT you can use in your business to increase the efficiency of your operations is what you would have looked for if you had attended the International Petroleum Exposition.

For those oil men who were not present, the Journal assigned its staff of technical writers to spend several days at the oil show and report on new developments and trends in techniques and equipment.

Through expert eyes they looked for things that are new, and particularly for devices which appear to be pioneering methods. The reports which follow are not a catalogue of the I.P.E., not an attempt to single out individual displays. They are the estimates of trained observers as to which exhibits were likely to have aroused the most interest among operating men in the applicable branch of the industry.

Drilling

TRENDS in drilling equipment, as evidenced by the I.P.E. displays, are notably: refinements in portability and mobility to shorten time and effort in rigging up and moving; more strength and power for faster and deeper drilling; and refinements in drilling controls and rig instruments.

Drilling masts . . . The trend toward mobility was striking in the newer drilling masts, and several manufacturers demonstrated new wrinkles in quick assembly and erection.

One major manufacturer exhibited a 94-ft. trailer-mounted cantilever mast with a capacity equivalent to A.P.I. derrick rating of 300,000 lb. It consists of only two sections, the top section being retractable into the bottom. It has a racking-platform fingering capacity of 5,760 ft. of 4½-in. drill pipe. The draw works and mast make up one load, while the 15 by 32-ft. substructure makes up a second load.

Another innovation is an integrated, self-propelled derrick and rig. This telescoping derrick, mounted on a truck and trailer, stands 93-ft. high to the bottom of the water table, and has a hook-load capacity of 200,000 lb. Racking-platform fingering capacity is 10,080 ft. of 2⅞-in. o.d. tubing in doubles.

The first of a new series of heavy-duty portable drilling masts was the 140-ft., galvanized, cantilever, portable unit displayed by one major exhibitor. The mast has a 25-ft. leg spread and a capacity of 1,035,000 lb. It is equipped with an eight-sheave crown block. The racking platform can handle up to 19,800 ft. of 4-in. drill pipe or 17,560 ft. of 5-in. casing.

There was a portable steel derrick that "walks" itself up on the drilling platform. The derrick rises directly from the ground on two pivot points, using both front and rear legs. Besides the feature of ease in raising and lowering, the technique increases the safety factor through reduction of loads on raising lines and draw works.

Draw works . . . What are reported to be the most powerful drum clutches on any rig were displayed on one new draw works. Low drum is two-plate, 44-in. diameter, 102,000 ft.-lb. torque capacity; high drum is two-plate, 38-in. diameter, 59,000-ft.-lb. torque capacity. Drum spool is 50 by 28 in. and is long enough to keep drilling line in the third wrap using 1¼-in. diameter and eight lines. Brake rims are 52 by 12½-in. Transmission features permit changing the rig into a torque converter or a mechanical drive by switching a single sprocket. Nominal horsepower rating is 1,200 hp.

A new medium-size drilling rig is capable of drilling to 7,500 ft. using 4½-in. drill pipe. Draw works has a horsepower rating of 550 at 1,200 r.p.m. Skid assemblies are equipped with machined V-blocks to facilitate rigging up and to maintain alignment; compound is featured by split case for each of the three prime-mover-engines and torque converters.

One new rig features two types of rotary drives, either chain drive or propeller-shaft drive. Transmission by means of hydraulic torque converters provides infinitely variable speed with high-torque multiplication.

Another rig's draw works is designed for 6,000-ft. drilling using 4½-in. drill pipe. It is driven by a diesel engine with an input rating of 300 hp. at 1,800 r.p.m. equipped with twin disk torque converter. Mounted on draw

POWERFUL SLUSH PUMP, this Model 818-P, unit has an input power rating of 925 hp. at a pump speed of 65 r.p.m. It has an 18-in. stroke with a range of working pressures ranging from 1,440 psi. with 8-in. liners to 2,750 psi. with 6-in. liners.

works are three twin-disk air-operated clutches and a single air-actuated drum clutch.

Hydraulic drives . . . Many new improvements feature fluid drive offered for all of the larger drilling rigs and for engines up to 700 hp. The degree of slip between driver and driven shafts is readily controlled by means of a sliding scoop which regulates the amount of fluid in the coupling, permitting the engine to operate at its optimum speed while the speed of the driven machinery is adjusted to suit requirements.

Major manufacturers incorporated torque converters in many of their new power units. Under development for more than 2 years, these larger units are now available in 29.5 and 34.2-in. sizes by at least one manufacturer to extend the range of converter operation to heavy-duty, medium-speed engines from 300 to more than 1,000 hp. ratings.

Converters improve performance characteristics in drilling service in that engines can operate at peak rating without lugging. Moreover, the converter automatically and continuously varies the output-shaft speed and the torque multiplication to suit the instantaneous power demand. Drill-pipe loads are started with high torque at low speeds and accelerated under full power. Pump speed adjusts automatically as drilling progresses.

Slush pumps . . . The most powerful mud pump offered to the drilling industry is rated at 925 hp. at 65 r.p.m. Working pressures range from 1,440 psi. using 8-in. liners to 2,750 psi. with 6-in. liners. The pump has an 18-in. stroke. In the design of the new pump a substantial saving in weight was obtained through the use of high-strength steel for heavier cast iron. It meets the demands of jet-bit drilling which requires high pressures and high horsepower yet is light enough to be moved by truck over all types of oil-country roads.

Another new 7½ by 14-in. duplex slush pump designed for jet drilling has a nominal input at 60 r.p.m. of 350 hp. Discharge pressures range from 838 psi. with 7½-in. liners to 1,627 psi. with 5½-in. liners.

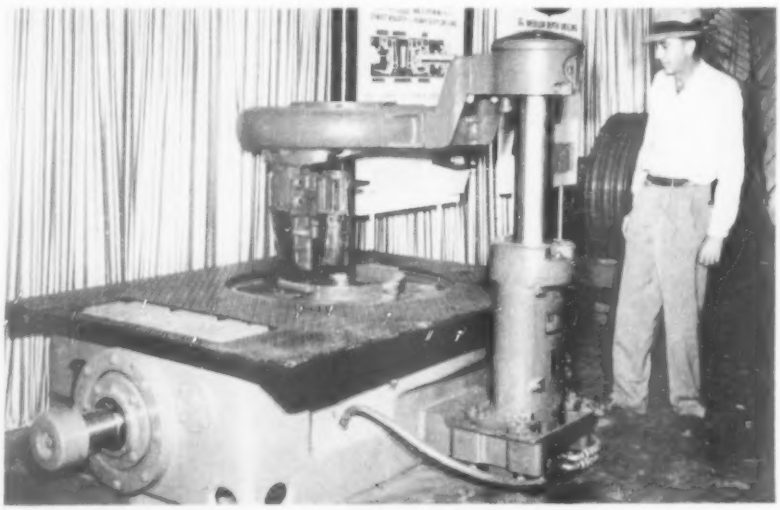
Unitized hook and block . . . At least two manufacturers displayed new combination hook and traveling blocks. One of the highest-capacity hooks displayed was a 400-ton, short-type unit. Initially furnished as a conventional traveling block, the unit can be changed in the field to a combination block and hook by addition of a hook-assembly piece. Unitized in this way it has an over-all length of only 12 ft. 8 in. and weighs 16,700 lb. It has hydraulically cushioned, spring-loading, 360° swiveling of hook and link ears, heavy-duty bearings, and balanced sheaves.

Another display in this trend was a new hook block wth a hook positioner and a flexible connection between the block and hook. The 200-ton-capacity hook-block combination has an over-all length of only 115 in. The hook positioner is located at the top of the hook. An arm carrying a cam follower can be locked into any angular position with respect to the traveling block.

One major manufacturer of traveling blocks presented a complete redesign, giving a narrower, more streamlined appearance through elimination of the use of spacers between sheaves. One of the important features is the low center of gravity of these blocks, which eliminates canting.

Drilling controls . . . A "Hydro-Mech" torque gage is one of several new instruments designed to increase penetration rates and lengthen bit life. The gage tells the driller when the bit is dull or when a bit bearing is burned out. In diamond coring operations, the instrument enables the driller to get maximum penetration without shortening diamond-head life. When drilling in deviated holes, torque reading is preferred over weight-indicator reading.

A speed-selector, dial-type instrument indicates the proper selection of draw-works drum clutch and transmission clutch for the most efficient hoisting of any particular load. This device interprets the tension in the dead-line and indicates the proper speed-ratio for hoisting. Its use in hoisting drill pipe assures the fastest



POWER SLIPS displayed above are pressure-raised and pressure-set by the touch of a foot pedal. Construction of arm simplifies installation and allows power unit and subbase to be mounted above bottom of rotary table with no protruding parts.

and most efficient operation of the draw works within its rated capacity. Use of the instrument specifically avoids use of speed ratios which are too high for the load which cause consequent overloading of chains, clutches, and engines, use of speed ratios lower than the load requirements with subsequent loss of valuable time; and use of power beyond draw-works rating where extra power is employed for slush-pump requirements.

A new and smaller automatic feed control for medium-sized rigs provides a smooth feed-off of the wire line from the draw works drum so as to give a constant bit weight as selected by the driller. The drilling-line load on the draw works drum is used to power the feed control, which limits the feed-off of the wire line.

Well completion . . . Several electric logging and electrical pilot services were displayed. One was concerned with radioactive fluid surveying. Radioactive materials are used for selective acidizing of specific predetermined zones using fresh water, salt water, or lease oil, without pulling tubing or setting packers; and also for channel-determination surveys using radioactive water, acid, or oil to locate channels of communication between zones.

Other kindred services included photoelectric water-location surveying for accurately locating water entry into oil and gas wells; a method of directing acid into predetermined zones; spinner surveying to locate fluid movement and measure flow rates into and from the formation; caliper surveying to record accurately well-bore diameters and irregularities; permeability surveying to record relative permeability of exposed zones and to locate leaks in casing.

Among the numerous products was a new chemical designed to inhibit corrosion in oil and gas-condensate wells. When introduced into the well, it mixes with the oil or brine encountered and is carried throughout the well, coating all metal surfaces. It is available in liquid or stick form.

A new well casing designed for setting depths of 21,300 ft. for 5½-in. pipe was introduced at the show. It has a minimum yield strength of 125,000 psi. and an ultimate tensile strength of 138,700 psi., and is designed to fit the trend toward deeper drilling depths where high reservoir pressures are encountered.

Production

NEW developments both in techniques and in equipment items featured production exhibits at the exposition. Some were more complicated than old methods, as in the case of microwave supervisory-control units, and some were simplifications and improvements on old techniques, as in the case of a new method of gas-lifting wells.

Much of the equipment demonstrated illustrated a trend toward improved performance with a consequent reduction in operating and maintenance costs.

Paraffin scraper . . . What is believed to be the world's first fully automatic paraffin scraper for flowing wells was demonstrated during the exposition by Stanolind Oil & Gas Co.

The new instrument was developed in Tulsa by the company's research laboratory. It is currently being field tested in various parts of the country.

Design of the scraper takes advantage of the difference in temperature between the surface and the bottom of the hole and makes use of the pressure of the moving fluid for operation.

Inserted in a well, the tool sinks to the bottom, where the higher temperature expands an alcohol-containing monel bellows which establishes a seal with the tubing wall. The flowing pressure then forces the instrument upward causing it to strip any accumulated paraffin from the walls of the tubing as it rises. The monel bellows actuates a series of "seal segments" which lock together as a result of the bellows' expansion and constitute the seal.

When the tool rises to the top of the well, the cooler temperatures permit contraction of the bellows, and the force of the rising fluid pushes the seal segments back into place. With the seal broken, the well fluid may pass the scraper easily, and it sinks again toward the bottom, beginning another cycle.

The scraper is so designed that it can be used in wells of widely varying depths and temperatures. All that is required is that there be an adequate difference in surface and bottom-hole temperature and that a pressure of 50 to 75 psi. be available at the top of the hole for pushing in the seal segments.

Depth at which the scraper stops and creates a seal with the tubing wall is determined by the amount of alcohol placed in the bellows. Designers of the equipment say that pressure on the seal segments as the tool rises in the well is so small that it is doubtful that it breaks the oil film on the tubing wall, indicating long service with little wear.

New gas-lift system . . . Another Stanolind Oil & Gas Co. research department development on display was its "ball pump" system for pumping deep wells, and especially those with low fluid levels.

Like the paraffin scraper, it is now being field tested and is not yet in commercial production.

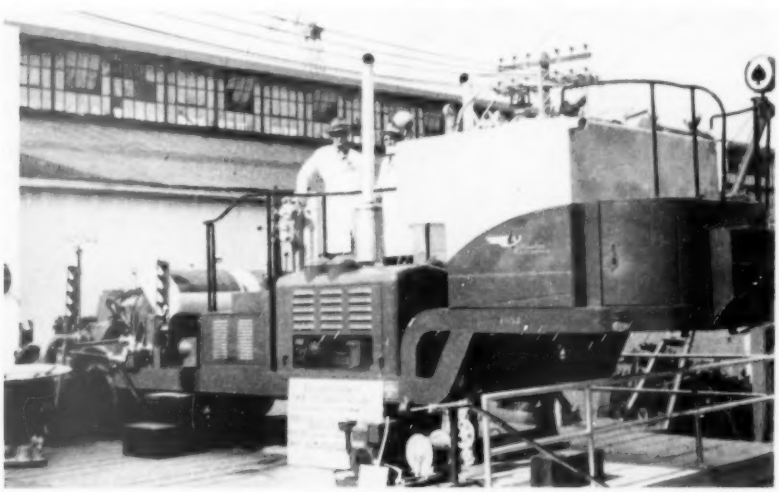
Some of the advantages claimed for the new system are these:

. . . There is no gas slippage, since there is a solid interface between the gas and the oil being lifted.

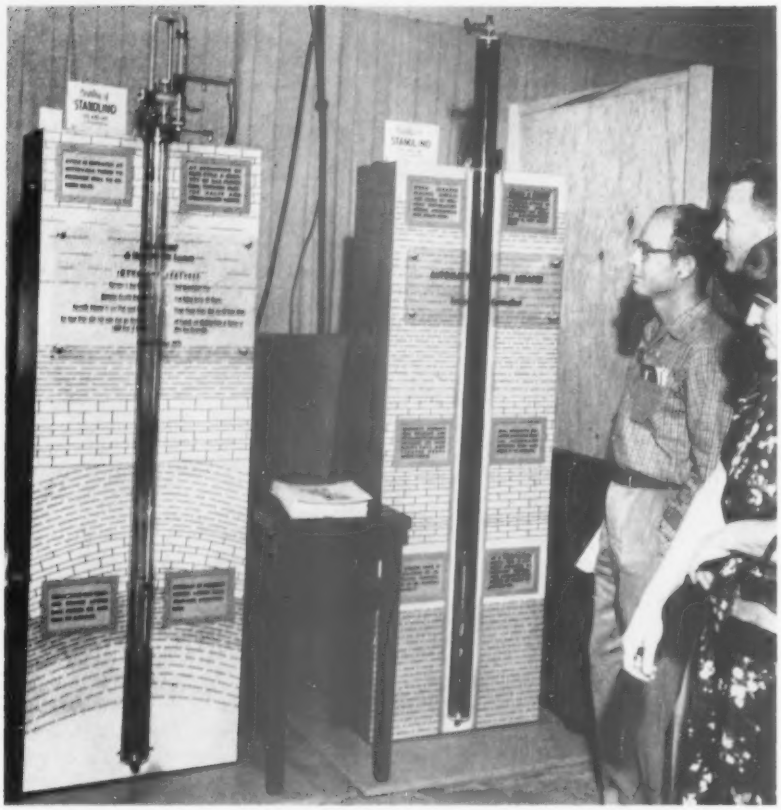
. . . All working parts are simple and are readily retrievable at the surface without pulling tubing.

. . . Passing of synthetic-rubber balls keeps paraffin accumulation to a minimum.

. . . Suspended sand can be handled without unusual difficulty.



LARGEST CEMENTING UNIT, this 450-hp. service facility has a rated operating pressure of 10,000 psi. Two 4½ by 10-in. plunger pumps are driven each by 225-hp. engines. Each pump is capable of delivering 438 bbl. of cement slurry per hour at 400 psi.



CROWD STOPPERS in the Hall of Science were these models showing, left, a new method for gas-lifting deep wells and, right, a fully automatic paraffin scraper for flowing wells. The models, prepared by the research department of Stanolind Oil & Gas Co., illustrate new production developments now being field tested.

. . . The system provides a positive means of introducing chemical corrosion inhibitors.

. . . Lifting cycles can be timed to any frequency, permitting handling of fluid volumes ranging from less than 10 bbl. to as high as 400 to 500 bbl. daily.

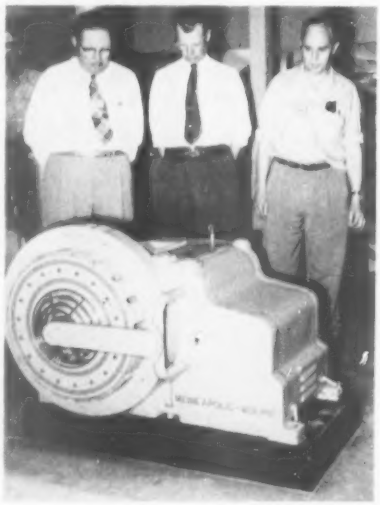
. . . Minimum back pressure can be maintained against the formation, ranging from separator pressure, as a maximum, down to atmospheric pressure.

The system uses a double string of tubing connected by a return bend near the bottom. A rubber ball drops down the gas-injection tubing string to rest on a constriction near the bottom. When gas pressure is increased sufficiently, the ball is forced through the constriction and through the return bend to the producing string where it picks up a slug of accumulated oil and carries it to the surface.

A hopper at the top of the assembly collects the produced rubber balls and holds them for reinjection into the gas string by a pressure-operated head which injects one ball into the power tubing ahead of each charge of injected gas.

A removable standing valve beneath the return bend at the bottom of the hole keeps back pressure off the formation while gas pressure is forcing a ball with a quantity of crude to the surface. As the pressure drops, the valve opens, permitting crude to enter the system.

According to its designers, the new-type system will operate with gas-oil ratios as low as 200 to 250 cu. ft. per barrel per thousand feet of lift. Gas consumption is simply that required to fill the production tubing to displace the head of oil accumulated during each cycle.



NEW PUMPING ENGINE designed to run for 1 year without servicing is the unit shown above, one of a new line of six radially cooled units.

New microwave uses . . . Another feature exhibit was a low-cost microwave system with a wide variety of possible uses in production operations.

Using one base station and any number of small receivers, the system could be used from a district office or other central location to start and stop flowing wells, open or close pipe-line valves, switch the flow of crude in tank farms, or start or stop electric motors or gasoline engines.

With a central base station and another transmitter in the field, with line connections to units to be controlled, the system could be used for instant recording in the district office of the flowing pressures or temperatures of field wells, liquid level in field tanks, or any other data normally recorded only in the field.

The system is flexible, providing either one circuit for voice and another circuit to carry a large number of "tone" signals for supervisory control of equipment, or for two voice circuits, or for all "tone" signals.

Also demonstrated was a microwave facsimile unit which could be tied into the low-cost system, using one of its voice circuits. With this unit, it would be possible to transmit meter charts, payrolls, or any other paper work from one station to another.

Secondary recovery . . . and more particularly water flooding — ranks with the top developments of the petroleum industry in the past 25 years. Some new water-flooding pumps had a front seat at the I.P.E.

The significance of secondary recovery is apparent. A barrel of reserve can be added to proven properties by water flooding for perhaps 15 to 20 per cent of the cost of each barrel of reserves found by drilling. Naturally there has been a rush in recent years to equip leases for water flooding.

One company more than 20 years ago first developed a 2 by 48-in. bottom-hole plunger. In 1943, it introduced a 3-cylinder horizontal piston type pump, housing a 6-in. stroke, with a range of piston diameter from 4½ in. down to 2 in. Today this line of horizontal triplex pumps as shown at the I.P.E. has been expanded to seven different sizes.

Another company exhibited for the first time a seven-plunger power pump which is part of the expansion of its line of vertical, heavy-duty multiplunger power pumps. This power-pump line, mainly used in water-flooding and pipeline work, was heretofore available with three plungers and has expanded to three, five, and seven plungers. Important features of the line are interchangeable plunger sizes, straight-through-flow, individual valve covers, complete automatic oiling system.

For gas injection . . . A new portable gas compressor unit for the oil and gas fields was one of the numerous I.P.E. "firsts" being displayed. It is driven by gears rather than belt.

Packaged-type portable compressor units have been of major importance during the past few years for such applications as field-gathering systems, gas-lift production of oil wells, secondary recovery, gasoline-plant auxiliary equipment, development of gas-transmission systems to the East, new techniques in rotary drilling, and many others.

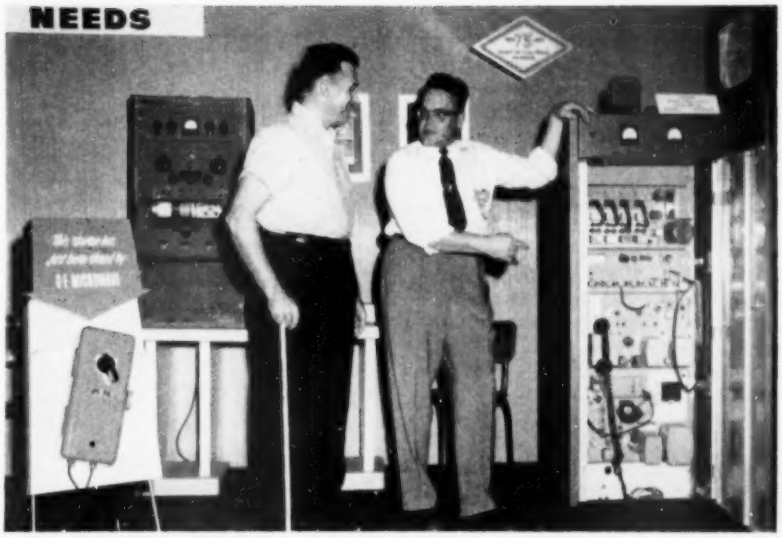
Because gears permit a more compact design, the new-type compressors are smaller in dimensions than the old belt-driven units. The unit on display was of the 125-hp. class. The gear-driven, duplex-type model is suited for gas-lift operations, maintenance of bottom-hole pressures, and gas gathering and transmission systems. It has a 9-in. stroke and can be operated either by gas engine or electric motor.

Materials . . . Created metals, now being used extensively in the oil industry by equipment manufacturers, are extending the life of equipment parts in some cases almost indefinitely over formerly used metals. Typical long-life applications for tungsten carbide, in this class, include A.P.I. balls and seats for subsurface pumps, gas-lift valves, and flow beans.

In numerous instances, balls and seats for subsurface pumps made with tunsten carbide are providing many times the life of alloy-steel balls and seats.

A tungsten carbide choke in Bonnie View field has outlasted the standard choke by a large margin. The original choke lasted slightly more than a day. The carbide-lined choke was in service over 1½ years without replacement.

Emergency control system . . . When a thunder storm disrupts power, an electrically operated oil-well pump stops abruptly. Demonstrations were made at the exposition of an automatically controlled "standby" power plant that can instantly spring into operation, pick up the power load, and have the well pumping again. Within seconds of power interruption from the prime source, the controls stop the auxiliary installation and automatically reset themselves for the next power demand. They are equipped with safety shutdowns in the event of low oil pressure, high water temperature, overspeed, or refusal of standby engine to start. They also can be installed with time clocks set daily at periodic intervals to test themselves and the standby set daily or at periodic intervals and to give visual or audible alarms if the installation requires fuel, water, oil, or mechanical adjustment.



WHAT'S NEW IN MICROWAVE for the oil industry is being shown by an exhibitor to Carl Compton, left, director of communications for Mid-Valley Pipe Line Co., Longview, Tex. At right a 960-mg. unit which can be used either for voice transmission or for supervisory control of field functions, or both. At left is a facsimile unit which can be operated through the unit at right for transmitting charts, records, and documents.

New-design pumps . . . Newly designed pumping units both beam and hydraulic, were shown by many exhibitors. One of the beam type had a one-piece, double-reduction, roller-bearing-equipped gear box and hydraulically removable wrist pins. This new pumping unit, available in floor-clearing or nonfloor-clearing models, retains wing-type counterweights that permit the counterbalance to be adjusted quickly and safely by one man working at ground level. A new arrangement of the gear train, which provides separate gear and pinion, makes possible the mounting of the bearings in line with the wall of the case, thus assuring maximum bearing support.

Another new engine, specifically designed for well pumping, was exhibited —the result of a 3-year development. The new engine is liquid-cooled, requires no external cooling, and is designed to run for 12 months without servicing. Fan-shaped segments on the flywheel take air in at the sides and direct it radially at high speeds. The system includes a special water return which eliminates the water pump.

The unit is self-contained and carries lubricating oil sufficient for 1 year's operation. The pan is in a completely hot-water-jacketed base, so that no sludging will take place even at —60° F.

A cutaway exhibit permitted visitors to see oil pumping in a joint of plastic tubing and a newly designed stuffing box for high-pressure wells.

A new engine starter shown is made in two types, with an air-cooled engine or a battery motor. Two pliable rubber friction wheels engage the pumping-engine flywheel by use of a hand lever. A centrifugal clutch on the air-cooled starting engine allows rope starting and also prevents slippage between the friction wheels and flywheel. The battery motor does not require a centrifugal clutch, since it can exert full torque at zero r.p.m. So long as the starting motor exerts a driving effort, the reaction of the flywheel resistance and the gear train constantly hold the friction wheels in the engaged position. At the first firing of the engine, the friction wheels are automatically disengaged.

Deep pumping . . . Most of today's pumping wells are considered shallow in the light of present-day drilling depths, but with the oil industry going deeper each year to find sufficient oil to take care of the country's needs, the time will soon come when it will be necessary to pump many of the deep wells being drilled today. Already a considerable number of wells at 10,000

and 11,000 ft. are being pumped with sucker rods and bottom-hole pumps.

One prominent manufacturer at the I.P.E. put the pumping selection this way: "The long-stroke hydraulic pumping unit has certain advantages for pumping these deeper wells. It is less likely to overload the sucker rods, because smaller pumps can be used at the bottom of the hole, creating less load, and longer, slower strokes reduce early fatigue which is due to frequent reversals of load. The walking-beam-type pumping unit becomes extremely large and expensive when strokes exceed 10 ft., while the hydraulic surface unit, a relatively recent development, gives strokes of 20 or more feet."

In one hydraulic pumping unit at the I.P.E., the piston in the cylinder is forced upward by hydraulic pressure. A large-diameter piston is used that requires less than 275 psi. pressure in the cylinder to lift a load of 37,000 lb. Because of the large surfaces exposed to cooling, water can be used instead of oil as a circulating fluid, reducing cost and danger from fire. The low pressure permits the use of a centrifugal pump for the hydraulic pressure, thus obtaining the maximum in cushioning effect.

Radioactive tracers . . . Radioactive tracers have been proposed for use in oil-well drill bits and information on them was presented at the I.P.E. In drill-bit use, they would serve to indicate relative wear of the bit. Knowledge of the amount worn from a bit would let an operator know whether or not to pull the drill pipe to change bits.

Radioisotopes, it was said at the exposition, are proving to be a valuable tool for use in studying the properties of cores brought up from oil wells. Oil and water-soluble compounds of gamma-emitting radioisotopes (iodine-131) have been used to determine the quantity of oil or water present in a core sample subjected to various laboratory tests.

Other applications of radioactive tracers in drilling operations include the use of radioactive materials in cements and resins. In this technique, a radioactive gamma-emitter (carnotite) is incorporated in cement which is then poured and its vertical distribution determined by the use of a gamma-ray log instrument.

Radioactive tracers have been used in an attempt to locate the acid level during oil-well-acidizing operations. In this application, radioactive material was added to the acid and location of the acid determined by dropping a Geiger-Mueller tube into the drill pipe.

Processing

A LARGE variety of process equipment for the refining, petrochemical, and natural-gasoline industries was exhibited at the International Petroleum Exposition.

Attention was particularly directed to the newer pump and compressor designs. New centrifugal pumps, single stage and multistage, for handling a variety of process fluids over a wide range of temperature and pressure, were shown. Provisions for mechanical sealing were strongly in evidence on the newer pump designs, reflecting improvements in mechanical seals made over the past several years.

Among the specialized fluid-handling devices were small, magnetic-drive pumps for handling extremely corrosive liquids and combination hydraulic motor-pump units which have recently found process application.

The compressors on exhibit featured improved workmanship, better fuel and oil economy, interchangeability of parts and better control and shut-down devices. Some gas-turbine applications were in evidence, including that as a drive for a fire-fighting pump and in an interesting combination now under development with a "free piston" engine.

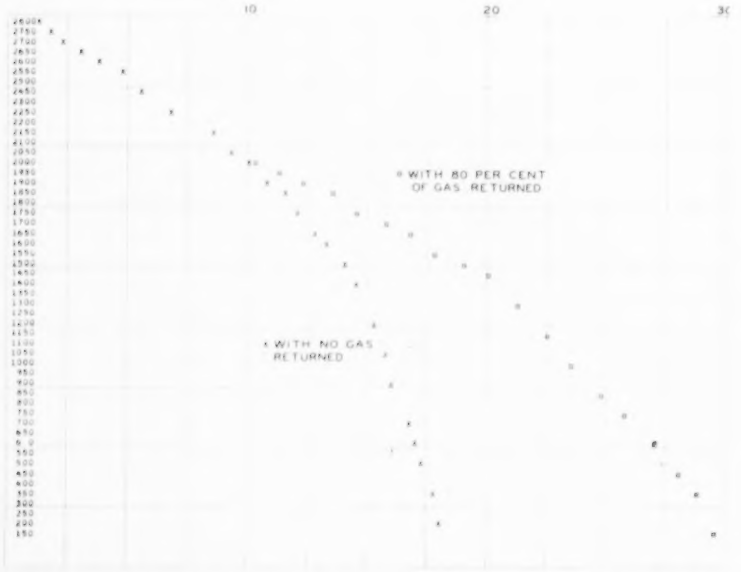
What is possibly the world's largest explosionproof, squirrel-cage motor for large-scale refinery application, a 3,000-hp., 48,000-lb., machine, also was on exhibit.

Included in the burner display was a new refinery heater designed for smokeless burning of refinery waste gases, in locations where smog is a problem.

A heat-exchanger exhibit was arranged by members of the Tubular Exchanger Manufacturer's Association (TEMA). This included cutaways of standard exchangers and reboilers, graphite (Karbate) and finned-tube exchangers, special closures for high pressures and a new, portable bundle puller. Small-scale test exchanger equipment used by the University of Delaware in research work on shell-side transfer characteristics formed part of the exhibit.

New refinery pump . . . A new refinery pump designed to handle extreme ranges of temperatures, pressure, and volatility, was shown. Required NPSH for the pump is extremely low. This facilitates handling of volatile liquids at temperatures close to flash point. The stuffing box is provided with renewable throat bushing. All stuffing-box pieces are faced and bored for mechanical seals. This new single-stage pump is available in capacities up to 13,000 g.p.m., for heads up to 600 ft. and temperatures up to 800° F.

In the larger sizes the double-volute casing allows operation over a wide



OIL-RECOVERY EXHIBIT in the Hall of Science was an elaborate display of punch-card machinery, including collators, electronic computers, and automatic printers. From the latter came this typewriter-like chart, giving curves for solution of a reservoir material-balance computation. The gain in oil recovery under gas-return operation, over straight depletion is charted automatically from the punch-card data. Vertical column of figures at left is reservoir pressure (psia.); horizontal scale is per cent recovery of stock-tank oil originally in place.

THIS GRAPHIC PANEL, built for the Sinclair Refining Co., Marcus Hook, Pa., refinery, is said to be the most fully explosionproof control panel yet built. Front view is shown at left, rear view at right.

head capacity range without excessive wear. Stuffing box and bearings are water-cooled. Danger of inflammable material escaping is prevented by a water-flushed smothering gland which also cools the shaft and sleeve. Maintenance is facilitated by an all-metal spacer-type coupling which allows the pump to be disconnected from the driver and the entire rotating element assembly to be removed without disturbing either the piping or the driver.

Liquefied gas transfer . . . L.P.G. compressors, in 5-hp. and 7½-hp. sizes, for transfer of fluids such as butane, propane, anhydrous ammonia also were exhibited. Some features of these units are four-piston-ring construction, centrifugal unloader, four-way reversing valve, maximum intake pressures to 250 psi., simplified oil-filling device, and large scrubber tank. These transfer units are also suitable for recovery of residual gases remaining in tank cars or holding tanks following removal of liquid.

Septuplex power pump . . . In the reciprocating pump line, a new seven-plunger power pump, in the vertical, heavy-duty multiplunger, power pump line was exhibited for the first time. This pump features separate interchangeable stuffing-box barrels allowing for interchangeability of plunger sizes, straight through-flow, individual valve covers and completely automatic oiling systems. Synchronized suction valve unloaders is another important feature. These permit a quick but gradual increase or decrease in fluid delivery between zero and full flow in not more than a half revolution of the pump. The pump is suitable for process charge, recycle, or other applications and can handle propane, butane, and other volatile liquids, since it is provided with close-clearance liquid end.

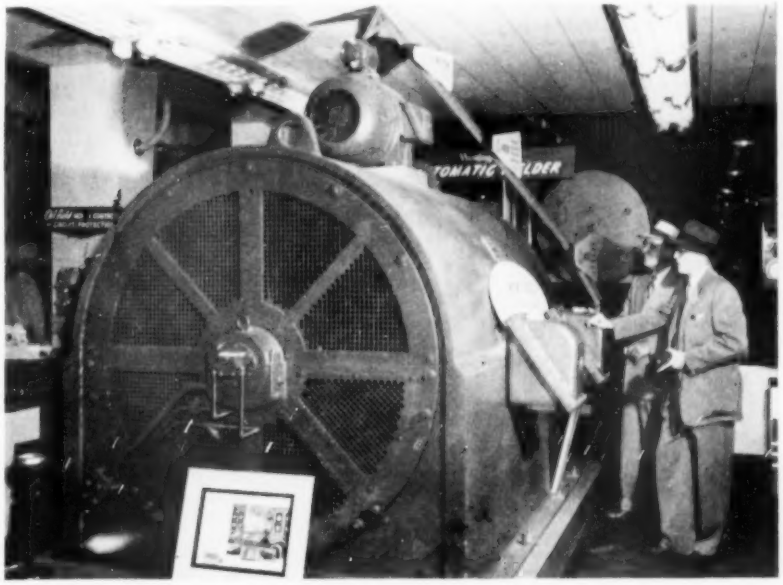
Magnetic-drive pumps . . . A small sealless, leakproof centrifugal pump in sizes up to 3 hp. (capacities to 150 g.p.m., working pressure to 150 psi., and temperatures to 450° F.) was shown. This pump, operating without stuffing boxes or mechanical seals, is especially suitable for handling corrosive, radioactive, and highly volatile fluids, for processes under vacuum, or for fluids which must be kept from contamination with air in oil. The pump is totally closed to the atmosphere and uses a magnetic rather than mechanical drive with no couplings or gear reducers. An integral rotor-impeller unit is the only moving part. A stainless steel sleeve completely encloses the stator windings, preventing contamination or short-circuiting by the fluid being pumped as it passes through the rotor chamber. The rotor is also hermetically sealed in stainless steel to prevent corrosion.

A cooling tube is used to carry a small quantity of fluid from the discharge port to the rear bearing housing where it enters the rotor chamber. This constant flow lubricates and cools the pump motor, eliminating need for outside lubrication.

Hydraulic pump-motors . . . A rotary-vane type, positive displacement hydraulic unit was on display. This has found specialized application in natural-gasoline processing (*The Oil and Gas Journal, April 27, page 162*). In this application, energy would normally be wasted in a pressure let-down of a rich oil stream is used to drive the motor unit which is directly coupled to a hydraulic pump. The hydraulic unit is used to pump lean oil to a reabsorber.

In these hydraulic units all moving parts rotate on trunnions which are mounted on bearings designed to operate only on the lubrication afforded by the liquid being pumped, such as gasoline, kerosine, etc. The unit operates on a liquid-seal principle, providing high volumetric and mechanical efficiency.

Blowers, compressors, gas turbines . . . Long-life and interchangeability of parts are a few of the characteristics inherent



BIG REFINERY JOBS can be handled by this 3,000-hp., 48,000-lb. electric motor, believed to be the world's largest explosionproof motor. B. S. Stanford, Gulf Refining Corp., Shreveport, and G. H. Klowman, Armco Steel Corp., Middletown, Ohio, examine unusual features of the motor.

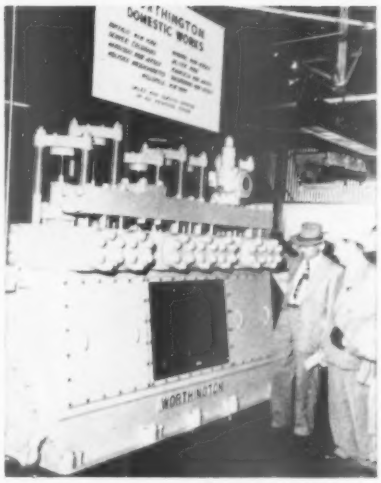
in the compressors exhibited. Other features of these later compressor designs include more compact units, small pounds per horsepower ratio, lower fuel and oil consumption, lesser discharge-piping vibration with reciprocating units, better instrumentation for speed and pressure control and for automatic emergency shut-down.

Free-piston, gas-turbine combination . . . An interesting innovation in a gas-turbine setup involves "free piston" engine in place of the combustor of the gas turbine. This engine employs no crankshaft or connecting rods. In the power stroke the pistons are moved freely on explosion of the fuel-air mixture until they cover the exhaust ports. In the return stroke the pistons are returned to their original position by the air which has been compressed on the back side of the pistons during the power stroke. This comprises the first, high-temperature step of the operation. Exhaust gases from this first step, now cooled down considerably, are employed for operation of the gas turbine.

Largest explosionproof motor . . . On display for really big jobs in the refining and petrochemical industries was what is believed to be the largest explosionproof totally enclosed squirrel-cage induction motor. This 3,000-hp. motor weighing 48,000 lb. was scheduled to be tested by Underwriter's Laboratory in Chicago following the exposition, after which it will be available for possible use as a driver for a large cat-cracker blower or other large-scale process application.

The motor is a fan-cooled "tube" type. Cooling tubes are employed in what is, in effect, an air-to-air heat exchanger. These tubes are assembled in frame rings near the outer periphery of the frame. An air blower is used to force external cooling air through the tubes. Air leaves the tubes at the rear or coupling end of the motor. Heated air from the stator-core ducts passes on the outside of the tubes. Internal cooling air is circulated by fans at each end of the motor. Circular baffles are employed to seal off internal from external cooling air.

Smokeless flare burner . . . Included in a display of plant burners was a flare burner for smokeless or nonsmokeless burning of waste or dump gases. Smokeless burning is obtained by steam jets surrounding the gas stream above the flare tip. Air is inspirated by the steam jet. The air and steam are both forced into the gas stream. The air injection combined with a water-gas reaction and turbulence suppresses smoke and results in burning of the flared gas with a clear blue flame. Tests have shown that steam consumption is approximately 6,000 lb. per 1,000,000 cu. ft. of flared gas.



A NEWLY DESIGNED 7-plunger, reciprocating pump suitable for refinery or petrochemical applications.

Instrumentation

A CONTROL panel, built for a propane-recovery unit in the gas-recovery section of the Sinclair Refining Co.'s Marcus Hook refinery, is believed to be the first such production model to be used as a display unit.

This full-size graphic control panel, completely wired and piped, cost in excess of $25,000. The panel was to be inspected and tested again, after the oil show, then shipped to Marcus Hook for installation.

Panel features . . . The panel weighs approximately 4,000 lb. and is 8 ft. high, 14 ft. long, and 26 ft. deep. It is said to be the most fully explosionproof panel yet built. All electrical connections, switches, and contacts, even the fluorescent lighting, have been protected against hazard. Miniature electronic multipoint temperature recorders and other miniature controllers and recorders for flow, pressure liquid level, and other process variables have been incorporated in the graphic panel.

Top-tower temperature control . . . Close control of fractionators, when a difficult separation is being made, by the use of a resistance temperature bulb together with an electronic-resistance controller was featured in another instrument exhibit. Use of a resistance temperature bulb provides a sensitive, accurate, primary element to go with an electrical bridge. The electronic recorder or controller employs an amplifier and detector for the unbalanced voltage resulting from change in measuring variables. A balancing capacitor is used in this system to rebalance the circuit.

Also featured in this exhibit were flow and pressure recorders, the former with a pressure-seal bearing, leak-tight against 5,000 psi., and the latter featuring a newly designed pivotless element.

NEW-DESIGN PROCESS PUMP for handling liquids over wide ranges of volatilities, temperatures, and pressures is viewed by J. P. Bassett, Sun Oil Co., Evansville, Ind.; and M. J. Schroeder, Sun Oil Co., Henderson, Ky.

New electronic control . . . Shown for the first time was a new control system based on a modified Kelvin bridge principle. This system, which has been employed for transmission, is now also available for control. It is particularly suitable for certain applications in a refinery or gasoline plant where no instrument air is available for pneumatic instruments or for control to remote sections of a refinery.

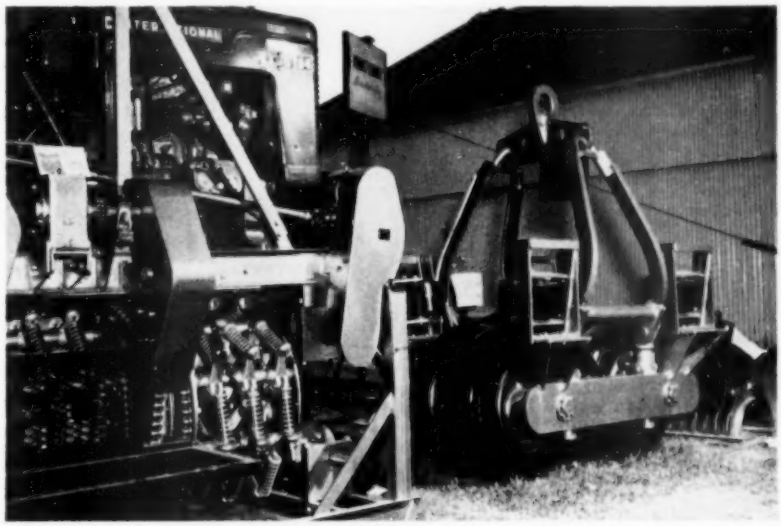
This is a complete electronic system with virtually no lag in the transmission signal. A simple direct-current signal is employed, insuring such accuracy that controllers can be board-mounted regardless of the distance from the process area where variable is being measured to the control room.

High stability of the system permits employment of narrower proportional bands with resulting high sensitivity. Control components are completely standardized to permit interchange at the panel regardless of the type of variable under control. Tiein with pneumatic systems is made possible by an electro-pneumatic transducer. Alternatively, standard pneumatic diaphragm-control valves may be positioned by an electric signal.

Remote gaging of storage tanks . . . Equipment for electronic remote reading of liquid level in storage tanks was exhibited. New and improved designs both in the mechanical and electrical sections of these systems have been incorporated. Mechanical design is for maximum utility with easy access to components. Improved and simplified electrical circuit design has resulted in better performance.

Indicators are provided with a "jump" circuit which keeps the foot meter pointer stationary until the inch meter pointer has completed a full 12 in. The foot meter pointer then "jumps" to the next increment, so that this pointer always indicates the direct foot reading. This electronic gager senses tank liquid level by measuring voltage output with tank transmitter units employing two precision potentiometers located at the tanks.

The potentiometer sliders are mechanically coupled to the tank gage float through tape sheave and perforated tape. A regulated electronic power supply in the receiver unit supplies direct current to the transmitter units.



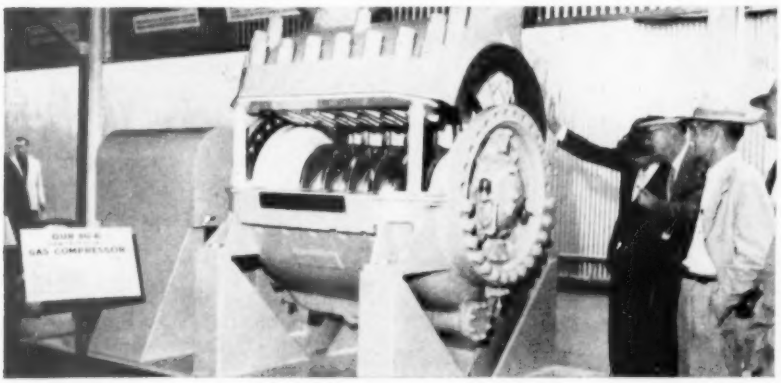
THIS ENGINE-DRIVEN BORING MACHINE exhibited at the I.P.E. will cut in a few hours a road crossing which would require 3 days to complete by the punching method. On one occasion this unit bored 450 ft. for a railroad crossing in a metropolitan area.

Pipe Lines

AN imposing array of equipment for laying, protecting, and operating pipe-line systems was laid out for I.P.E. visitors in 363 pipe-line exhibits during the big oil show's 10-day run.

Crowds milling through the exposition grounds saw virtually every piece of equipment needed to complete a pipe-line construction job—from right-of-way clearing to clean-up.

Ditching machinery on display ranged from big-inch equipment to small machines for utility trenching assignments.



CENTRIFUGAL GAS COMPRESSOR, a 2,200-hp. unit, is designed for a capacity of 2,850 cu. ft. per minute at 81-psia. suction pressure. Design-discharge pressure is 280 psia. This unit is typical of modern centrifugal-compressor designs used for process application.

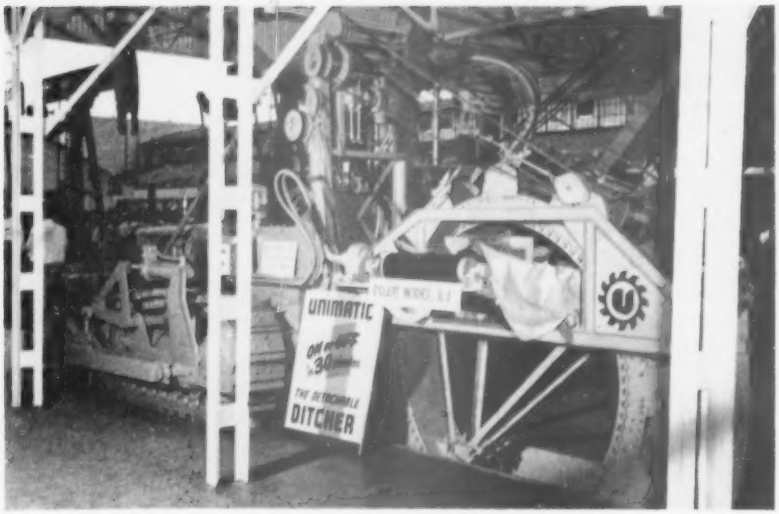
Detachable ditcher . . . One major manufacturer exhibited a full-size pilot-model "detachable" ditcher from which the tractor or prime mover can be detached in less than 30 minutes to permit its use for other operations, such as backfilling or bulldozing.

The unit, soon to be in production, incorporates motorized hydraulics which permit it to operate at speeds from as low as 4 in. a minute to as high as the material it is working will permit.

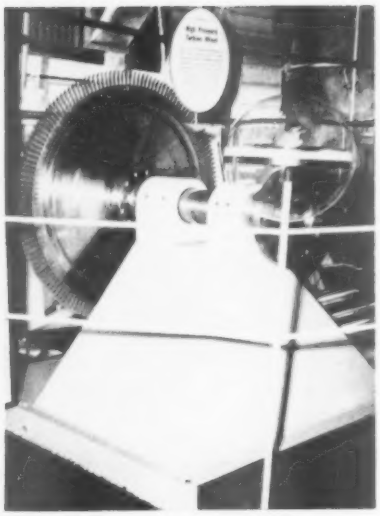
The ditcher is so constructed that the tractor's clutch cannot be engaged as long as the hydraulic unit is operating the ditcher. The independently driven, hydraulically powered conveyor may be stopped, reversed, or see-sawed readily. The ditcher portion of the unit, which digs a 20-in. trench, is no wider than the tractor.

One of the smaller ditchers on exhibit was a highly mobile unit with a maximum trenching speed of 17 ft. per minute and a road speed of up to 12.6 miles per hour. Operated by one man, this ditcher is capable of digging a ditch 5 ft. deep and from 8 to 12 in. wide. The unit also can be adapted, by the addition of an optional 6-ft. blade, to backfill its own trench.

Largest tractor . . . What was termed



PILOT MODEL of a new ditcher, on display for the first time and soon to be in production, features detachable prime mover. Tractor can be detached in less than 30 minutes and used for other tasks such as backfilling or bulldozing.



GAS TURBINE, designed to drive a centrifugal compressor in natural-gas pipe-line service, has a high thermal efficiency rating.

the world's largest crawler tractor—a 41,000-lb. colossus driven by a 175-hp., 6-cylinder diesel engine—also was on display. The big unit features a hydraulic torque converter instead of the conventional engine clutch, which enables it to virtually creep or to travel at speeds up to 7 miles per hour. The operator is said to be able to handle the big crawler with ease due to its hydraulic steering controls.

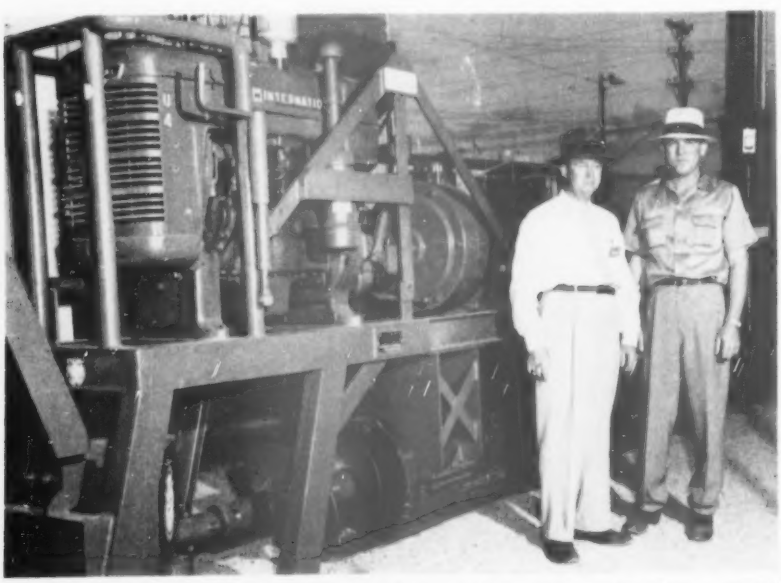
Brush and trees up to 6 in. in diameter are cleared from pipe-line rights-of-way at speeds up to 5 miles per hour by another versatile machine on exhibit at the exposition. The 15-ton unit is mounted on a crawler-tractor and powered by a 175-hp. diesel engine. It clears a swath 6 ft. wide, reducing all undergrowth to small fragments without disturbing the topsoil, according to the manufacturer. It accomplishes this through the rapid rotation (1,007 r.p.m.) of a steel drum to which are attached 20-lb. chrome-manganese-steel "flails."

Compact control unit . . . Attracting considerable attention was an exhibit featuring an automatic control system for pump stations on crude or products lines in which all instruments and other operating devices (with the exception of line-mounted transmitters) are centralized in a single control cabinet.

The unit, shown for the first time at the I.P.E., starts and stops the station, controls it when on line, shuts it down in emergencies, and logs operating data. When on line the station is governed by four controllers which respond to four variables—suction pressure, discharge pressure, power consumption, and flow. If one of the variables threatens to violate a preset limit, its controller corrects that condition by throttling the station discharge valve. Control-point settings may be adjusted manually or remotely. The station can be put on line automatically (such as response to flow) or by remote stimulus (microwave or telephone system). Thus initiated, a complete sequence of start or stop operations is automatically carried out by relays.

Station protection is assured by electrical contacts which, if dangerous conditions develop, stop the pumps and prevent damage to equipment. Individual alarm lamps signal the nature of the trouble so that an attendant on arriving at the station can spot the source of trouble immediately.

Cabinet-mounted instruments keep records of all important variables, including pump and motor bearing temperatures.

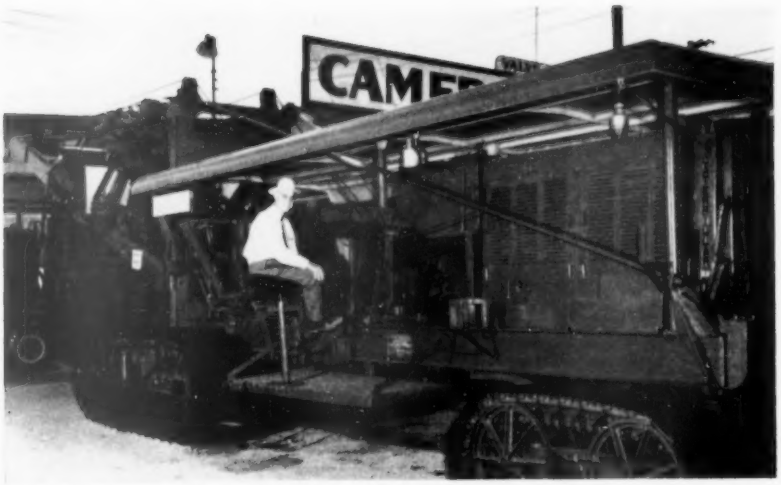


LOWERING-IN CRADLE, operated pneumatically, protects coating when pipe is lowered into the ditch.

Other new items . . . The first two-cycle, turbo-charged gas engine ever built was on display. It is a 1,320-hp. unit with a 14-in. bore and 14-in. stroke.

Larger units of this type are in the process of manufacture. Such units will use 25 per cent less cooling water per brake horsepower. These units are quiet in operation, take less space, and have low fuel consumption. Scavenging cylinders are eliminated .

Also exhibited were: A 10-bbl. agitator dope pot mounted on four wheels



BIG-INCH DITCHER has hydraulic equipment for conveyor-belt operation, for raising and lowering the digging wheel, and for steering. Speeds of conveyor and digging wheel can be regulated independently.

to serve small contractor operations on favorable terrain; a new six-cylinder valve-in-head truck engine which has been redesigned for oil-field power units; a dope kettle with a hydraulically operated agitator which is stopped automatically if foreign matter intrudes into the hot coating material; an improved vertical-type bending machine which will handle pipe up to 36 in. in diameter; and hydraulic tractor counterweights which are hinged at the top and have the advantage of avoiding trouble from mud.

Exploration

THE latest in exploratory seismograph equipment and the new dip logging tool of those exhibits outside the Hall of Science, were the prime interest of exploration men at the International Petroleum Exposition.

Seismic surveying instruments, both standard truck-mounted and portable models, and the most modern of seismic-crew vehicles were on display.

One exhibit included new recording truck, shooting truck, and dynamite-magazine trailer. The recording truck has an all-welded steel body with a stainless steel lining. The body of the truck is insulated with 1½ in. of spun glass. Temperature of the cab is thermostatically controlled. It is equipped with an electrically driven reel holding about 1 mile of 24-conductor cable and a heater for the developing solution.

Batteries for instrument power are located on the back step of the truck for easy accessibility. The 24-trace units are mounted in welded-steel racks, and all instruments are mounted on stainless-steel chassis with stainless-steel front panels. The instruments in this truck are capable of recording 48 channels of information enabling mixed and unmixed records to be taken simultaneously.

The shooting truck is equipped to carry 400 gal. of water in a tank complete with burner for extreme cold-weather operations. This tank, operated off the intake manifold, can be filled in 2½ minutes. The truck can carry a day's working amount of dynamite and has a trailer hitch for hauling a dynamite magazine. It has reels for firing and communication lines and a compartment for radio equipment.

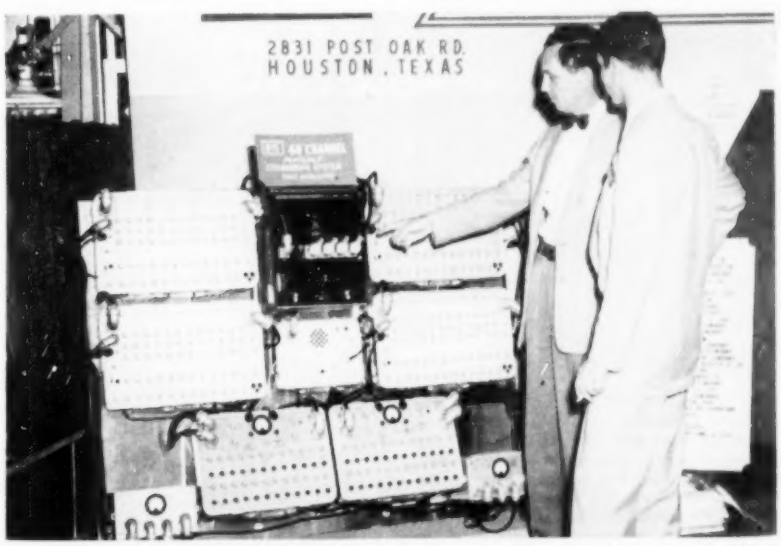
Portable seismograph . . . The portable seismograph exhibited is a 48-trace application of the normal 24-trace equipment. No one unit weighs more than 50 lb. This portable equipment can be mounted in practically any kind of vehicle or boat and is designed so that it can be removed from mounting brackets, snapped into water-tight cases and carried to locations inaccessible to vehicles.

New dip-logging tool . . . The new dip-logging tool is now being used commercially. There are two instruments on the Gulf Coast and one in the Mid-Continent area. This new electronic bore-hole logging device determines the dip of subsurface formations for the purpose of locating wells higher on structure and pointing out the direction to develop oil-bearing reservoirs discovered.

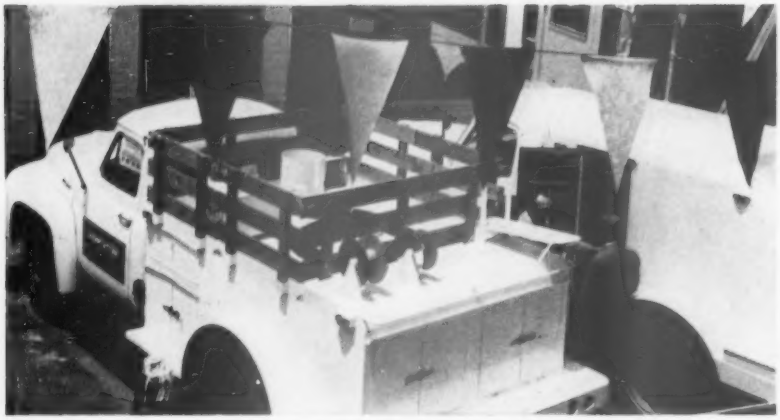
Shot-hole drilling . . . Use of compressed air for exploration drilling of shot holes for reflection seismograph operations was demonstrated at the exposition. The truck-mounted rig has a 5¼-in. opening on a rotary table mounted with spiral bevel gears. It is driven by two 1¼-in. pitch chains actuated by two hydraulic motors.

A constant-pressure, variable-volume, vane-type pump operates the high-torque capacity fluid motors, giving required power without gear boxes or jaw clutches. Motors "free wheel" while pulling up for spudding or rod connections. The air compressor is mounted on the truck body back of the draw works. Capacity of the rig is 1,000 ft. using 2⅜-in. drill pipe.

On a recent exploration drilling job the rig cut 72 holes per day ranging in depth from 15 to 60 ft. each. Two



PORTABLE SEISMOGRAPH EQUIPMENT, displayed as when mounted in a truck. This is a 48-channel application of the better known 24-trace portable seismograph set.



SEISMOGRAPH TRUCKS with the newest features were exhibited at the I.P.E. At left is a shooting truck and to the right a recording truck equipped with a 24-trace unit.

setups were made each day, and 36 holes cut per location. Average daily drill-hole production was 1,800 ft. on continuous-profiling seismic exploration.

Another portable drill, which requires no kelly, was making hole at the I. P. E. grounds. This drill, adaptable to shot-hole and core drilling, has a lever-type mast with a 12-ft. stroke and a 4-ton down pressure throughout the entire stroke. The hydraulically operated drill can be mounted on a standard long-wheel-base, 1½-ton truck. It carries 300 gal. of water or an air compressor for dry removal of cuttings. It will dig a 3-in.-diameter hole to 1,000 ft., making about 100 ft. per hour through a clay-shale section with 15 per cent limestone.

Sample dating . . . An exhibit of interest to exploration men studying recent sediments for keys to older rocks was that on the dating of samples by the Carbon-14 method. This exhibit showed that samples of any kind (including semimarine) which will yield as little as 6 g. of carbon can be dated with considerable accuracy. A 10,000-year-old sample can be dated with an accuracy of plus or minus 460 years. The accuracy of measurements increases for younger samples and decreases for older samples. The highest age that can be determined by this method is 22,000 years.

HALL OF SCIENCE visitors included Joe Guerry of the American Museum of Natural History (closest to camera) who was in Tulsa for ideas on a petroleum geology exhibit being prepared in New York muesum. Also in the group at the geological exhibit are, left to right, Parke Dickey, Carter Oil Co., Tulsa; Carl Maas, art director, Standard Oil Co. (N.J.), New York; and Kent K. Kimball, executive secretary of the Hall of Science.

NEW DIP LOGGING TOOL displayed alongside sidewall sampler was of high interest to exploration men at the I.P.E.

An electrical well logger which may be transported in and operated from a passenger car for use in relatively shallow holes was of special interest to men from areas where core-drill programs are found a useful exploratory tool. This particular portable logger is for use in relatively shallow holes such as seismograph shot holes or core holes less than 500 ft. deep. It carries 500 ft. of cable and the cable reel is hand cranked. Normally this logger gives only a point resistance graph.

Pioneers Honored

Quaker State chairman presented medal as "pioneer of pioneers" in ceremony highlighting petroleum exposition

HARRY J. CRAWFORD, chairman of the board of Quaker State Oil Refining Corp. and widely known oil man and banker, was awarded the title of "pioneer of pioneers" of the petroleum industry in a colorful ceremony May 17 at the International Petroleum Exposition in Tulsa.

Crawford was presented an inscribed gold medal in a ceremony honoring also six others as "grand old men" of the various divisions of the petroleum industry. They are:

. . . **Production:** W. L. Connelly, advisor to Sinclair Oil & Gas Co.

. . . **Transportation:** Wallace R. Finnery, former pipe-line advisor to Standard Oil Co. (N. J.) and before that head of several Jersey affiliates.

. . . **Natural gas:** Dr. Godfrey L. Cabot, president Godfrey L. Cabot, Inc.

. . . **Natural gasoline:** Dr. George G. Oberfell, former vice president of Phillips Petroleum Co. in charge of research and development.

. . . **Refining:** Edwin B. Reeser, former president of Barnsdall Oil Co.

. . . **Supplies and equipment:** Wallace D. Wilson, president of Wilson Supply Co., Houston.

Each was presented a medal by W. G. Skelly, president of the exposi-

PIONEER OF PIONEERS, Harry J. Crawford, addressed the crowd briefly after receiving his award.

OLDEST PIONEER in the group was Godfrey L. Cabot, 92, shown being presented his gold medal by W. G. Skelly, left.

tion and president of Skelly Oil Co., except for Oberfell, who is in Europe and whose award was received by Mrs. Oberfell.

B. L. Majewski, president of Great American Oil Co., Chicago, and principal speaker at the event, told the crowd present for the ceremony that the seven oil men honored by the exposition typified the difference "between life in this country and the rest of the world."

Each, he said, began in some minor capacity "and through sheer force of personality scaled the heights to great success in his chosen field."

P. C. Lauinger, publisher of The Oil and Gas Journal, served as master of ceremonies. He described the event as a "fitting climax" to a great petroleum exposition.

Crawford's selection as pioneer of pioneers was based on his career as one of the founders and a major developer of the natural-gas industry in this country.

He entered the oil industry in 1888 as a foreman for South Penn Oil Co., 2 years later became superintendent for Pennsylvania Fuel Supply Co., and soon helped to organize the companies making up the present Columbia Gas System.

In addition to his Quaker State position, he is a director of several other oil firms and is president of two Pennsylvania banks and a director of six more.

Oldest of the "grand old men" of the oil industry is Cabot, who entered the petroleum industry as a chemist in 1882 and planned and built his first carbon-black plant a year later. He is now in his seventy-first year in the oil industry.

On the platform with the oil men who received their awards were William J. Sherry, Tulsa independent and chairman of the committee which selected the honorees, and Ernestine Adams, editor of the Petroleum Engineer.

PIONEERS OF OIL received their gold medals before this crowd at the International Petroleum Exposition May 17. Band in foreground is that of Oklahoma Military Academy.

Miss Adams was presented an award as the outstanding woman in the petroleum industry, the first such award ever made, by W. K. Warren, chairman of the board of Warren Petroleum Corp.

Industry Briefs

AUSTIN.—D. H. Tucker, of El Paso Natural Gas Co., told the Texas Railroad Commission at its recent production-allowables hearing here that his company has made provisions for handling about 100,000,000 cu. ft. of natural gas daily from the Spraberry trend area of West Texas, and that by January it will be able to handle 200,000,000 cu. ft. daily when new facilities are available.

DALLAS.—Byrd Oil Corp. has acquired McConnell Drilling Corp. and Anco Gas Corp. through an exchange of stock. All are located here. Byrd was formed in 1947 and in 1952 acquired Four Corners Oil Corp., which operates in the Rocky Mountains. McConnell Drilling also operates in the Rocky Mountains and holds some undeveloped leases. Anco Gas has interests in 27 wells in Texas, a small refinery, and a recycling plant.

AUSTIN.—Hearings will begin June 2 before the Texas Railroad Commission on an application to unitize Fort Chadbourne oil field in West Texas The unitization plan is being submitted by Humble Oil & Refining Co. The field, which was shut down for more than a year by the commission to prevent waste of casing-head gas, reopened recently after facilities for utilizing the gas were placed in service.

WASHINGTON.—The National Petroleum Council will hold a testimonial dinner May 27 in the Carlton Hotel here in honor of J. Ed Warren, deputy petroleum administrator of the Petroleum Administration for Defense. Warren has announced that he intends to return to private industry June 30. He succeeded Bruce K. Brown as deputy petroleum administrator May 29, 1952. Previously, he had served as associate deputy administrator for about 2 months.

CALGARY, Alta.—Edoran Oil Corp. has bought the stock of Lloyd Petroleum Drillers, Ltd., for $100,000 cash and 175,000 shares of Edoran stock. The newly acquired firm will be operated as an Edoran subsidiary, according to O. V. Burkinshaw, Edoran president. Lloyd operates two rotary rigs and has a quarter interest in two producing wells.

FROM MEXICO, left to right: Jose Estrop M., National Supply Co.; E. L. Decker, Martin-Decker Co., U.S.A.; Alfonso Barnetche, manager, production, Petroleos Mexicanos; Mrs. Mario Cueto; Mario Cueto, regional manager, South America, Reed Roller Bit Co.; and Jorge Flores Munoz, Ampco Metals, Inc., Mexico.

FROM TUNISIA, left to right: Nouly Henri, manager of SEREPT (Petroleum Exploration Co.), Tunis; B. de Beaumarchais, engineer, SNREPAL (oil-exploration firm), Algiers; and Leca Fernand, technical manager for SEREPT in Tunisia.

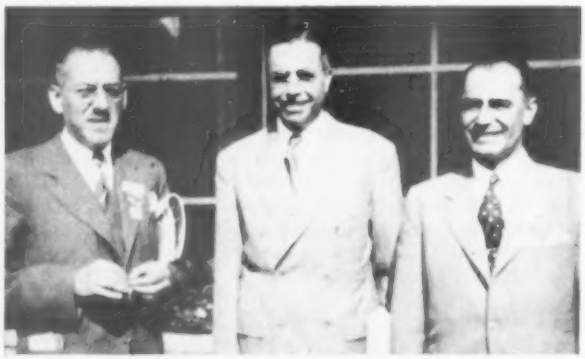
Foreign Visitors Throng I. P. E.

HUNDREDS of visitors representing more than a score of nations, attended the thirtieth-anniversary International Petroleum Exposition in Tulsa last week.

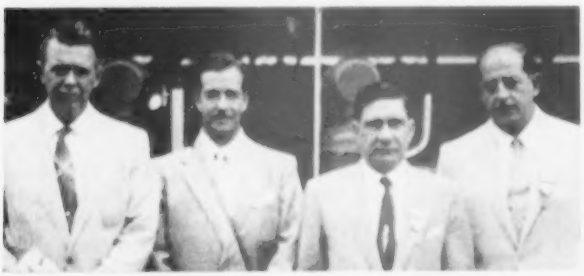
Most of the delegates, in Tulsa to "brush up" on the latest improvements in drilling and production equipment and refinery techniques, expressed amazement at the technological advances made in the past 5 years alone, since the last show was held.

Shown here are a few of the foreign guests, caught by The Oil and Gas Journal's camera in various spots on the huge 28-acre International Petroleum Exposition grounds during the 10-day "run."

FROM FRANCE, left to right: Tachet des Combe, petroleum engineer, Societe Cherifienne des Petroles, Paris; Berquint Andre C., manager, Societe Cherifienne; Jean Curutchet, petroleum engineer, Institute Francais du Petrole; and Srecko Kajfez, European representative, Cardwell Manufacturing Co., Paris.

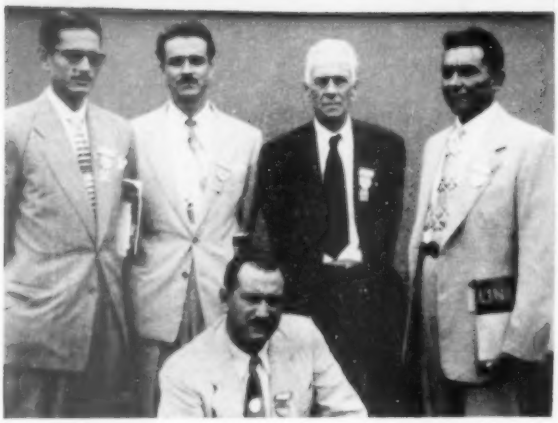


FROM BOLIVIA, left to right: Jorge T. Lavadenz, general manager, Coper, Ltda., drilling contractors, La Paz; Jose Paz Estenssoro, vice president and director, Yacimientos Petroliferos Fiscales Bolivianos; and Eduardo Hinojosa, general manager, YPFB. Paz is brother of Bolivia's president.



FROM PERU, left to right: E. C. Breene, production department, International Petroleum Co., Ltd., headquartered at Coral Gables, Fla.; Leopoldo R. Pflucker, special assistant to the general manager, I.P.C., Lima; Fernando Saravia, assistant director, petroleum section, Ministry of National Development, Lima; and Adolfo Bustamante, inspector-general of oil fields for the Ministry of Development, Lima.

FROM GERMANY, left to right: Christian Homann and Walter Ruhig, engineers for Eisenwerk Wulfel, Hannover; Herman Budde, director of that firm; and Walter Meyer, chief engineer. Wulfel manufactures production and drilling equipment and these men were in charge of the company's exhibits on the exposition grounds. This is the first time that the German equipment company has exhibited.



FROM MEXICO, left to right: Oscar Arreola, chief petroleum engineer, northern zone, Pemex; Pedro de Garay, Baker Oil Tools representative for Mexico; Luis de la Garza, drilling supervisor in Ebano field for Pemex; Jesus Cardenas C., drilling superintendent in Exequiel Ordonez field, Mexico, for Pemex; and Enrique Noguera B. (kneeling), tool pusher at Poza Rica field for Pemex.

FROM Venezuela is J. Wirtensohn, drilling superintendent for Shell-Caribbean Petroleum Co., Maracaibo at Desk and Derrick Club booth.

FROM GERMANY is Fred Bruell, engineer for Eisenwerk Wulfel, of Hannover. He is shown demonstrating a slim-hole drill at his company's exposition exhibit site. The firm exhibited several different models of pumping units at its outdoor location.

FROM BRAZIL, left to right: Carlos E. Paes Barreto, superintendent, Mataripe refinery, Conselho Nacional do Petroleo; Fernando Ramos Ribiero, U. S. representative for Mataripe refinery; and Yvon Goncalvez, head of the refinery's maintenance department.

MIXED GROUP is, left to right: Hector Marin, engineer, Shell-Caribbean Petroleum Co., Maracaibo, Venezuela; Santiago Gutierrez, drilling superintendent for Pemex, Reynosa, Mexico; and Guillermo Bernal, petroleum engineer, Pemex, Reynosa.

FROM VENEZUELA, left to right: John F. Herold, A-Z Export Co., Puerto la Cruz; A. D. Hunt, chief field mud engineer, Mene Grande Oil Co., S.A., eastern Venezuela; and Harry F. Simons, manager, A-Z Export, Puerto la Cruz.

MIXED GROUP is, left to right: Dr. Gilberto Chirinos, vice president, Consejo Superior del Petroleo, Lima, Peru; I. B. (Tom) Sutton, head of General Machinery & Supply Co., Tampico, Mexico; and Mario L. Villa, of Tipsa, Ltda., Buenos Aires.

FROM BRAZIL, left to right: Geonisio Carvalho Barroso, petroleum engineer, Conselho Nacional do Petroleo, Rio de Janeiro; Mrs. Barroso; J. H. Lewis, vice president, Drilling & Exploration Co., under contract with the Conselho; and Romeu Marquez, Geohydro, S.A., representative for Oil Well Supply Co., Rio de Janeiro.

FROM Venezuela is Walter Bitterling, equipment-company representative, Caracas. Photoed at the Journal booth.

VISITING at Nomads headquarters are, left to right: Henry W. Pullman, Baker Oil Tools, Inc., Los Angeles; and Eduardo Simian, Empresa Nacional de Petroleos, Santiago, Chile.

COMPARING NOTES during the oil show were these Stanolind Oil & Gas Co. men. Left to right are T. C. Borland, assistant division production superintendent, Oklahoma City; H. L. Olson, district superintendent, Ellinwood, Kans.; George McCray, division drilling superintendent, Houston; E. A. Renfro, division gas superintendent, Houston; and L. L. Smith, superintendent of the company's Brownsville, Tex., chemical plant.

STANOLIND GROUP examining a horizontal compressor included G. A. Younie, field superintendent, Ellinwood, Kans.; L. L. Smith, superintendent, Brownsville, Tex., chemical plant; C. O. Hopper, field superintendent, Calgary, Alta.; and G. C. Wight, assistant division production superintendent, Houston.

Field Men Attend Exposition

ENGINEERS, superintendents, foremen and other operating men from all over the country flocked to the International Petroleum Exposition in Tulsa to see the latest in new techniques and equipment and to sniff the trends in their particular branches of the oil industry. Shown here are representative groups brought in by operating oil companies eager to give their field personnel an opportunity to view the thousands of exhibits making up the greatest display of oil-industry equipment ever assembled. Typical of the thousands of oil men who visited the show, the operating men shown here gathered from seven oil states and Canada.

SERVICE PIPE LINE CO. field employes attending the oil show. Left to right are Charles L. Wilson, district superintendent, Kearney, Neb.; George L. Miller, district superintendent, Galesburg, Ill.; R. J. Elliott, district superintendent, Stafford, Kans.; R. M. Lewallen, telephone and telegraph foreman, Wichita, Kans.; C. W. Nielson, division engineer, Wichita, Kans.; R. R. Strand, division manager, Casper, Wyo.; and C. F. Simes, division engineer, Lubbock, Tex.

ANOTHER GROUP of Service Pipe Line men included, left to right: David Aldridge, machine foreman, Lubbock, Tex.; Woody Bertz, machine foreman, Casper, Wyo.; Rex Puckett, area master mechanic, Galesburg, Ill.; Dal Clark, motor-transport superintendent, Tulsa; H. N. Woodard, area master mechanic, Wichita, Kans.; and Jack Keyes, area engineer, Casper, Wyo.

SUNRAY OIL CORP. field men included L. T. Moffatt, field superintendent, Oxford, Kans.; J. A. Parry, field superintendent, Victoria, Tex.; and T. H. Acres, chief engineer, Los Angeles.

INSPECTING A DRUM HOIST was this group of Stanolind Oil & Gas Co. representatives. From the left they are Stanford Chesson, tool pusher, Alvin, Tex.; H. H. Wagner, field superintendent, South Houston, Tex.; G. A. Reynolds, field superintendent, Gorham, Kans.; and G. H. Lancaster, district engineer, Ellinwood, Kans.

Busy Refiners

A.P.I. division maps active year for committees on research studies, publications, continuing projects

George Weber

NEW YORK.—A busy year for refining members of the American Petroleum Institute was mapped at the midyear meeting of the Division of Refining—the biggest in its history, with an attendance of 1,165 from 23 states and 8 foreign countries.

Next year's meeting will be held at the Shamrock Hotel, Houston, May 10-13. The program will include two sessions on maintenance, two on analytical research, and one each on waste disposal, motor fuels, corrosion, chemicals from petroleum, and training, plus a special session on fractional distillation. In addition, the division will sponsor a processing session at the annual A.P.I. meeting in Chicago next November, including papers on catalytic reforming and residual-oil coking.

The various committees of the division, which held 33 meetings during the 4-day session of the convention, have an active program for the coming months. Composed of a cross-section of industry, these committees aid in organizing formal technical sessions, sponsor research projects, conduct surveys, compile services to refiners, and coordinate the work of the industry with that of other related groups.

Abstracts . . . An example is the new A.P.I. Technical Abstracting Service which is the work of the committee on petroleum products. This weekly, self-sustaining abstract will begin January 1, 1954, and will be available to the petroleum and other industries through subscription. A director has been retained to head the service. A total of 100 periodicals will be abstracted initially and although they are selected for their coverage of the refining field, they will be abstracted from technical material dealing with other branches of the industry as well.

Glossary . . . Another project of the petroleum products committee is the "Glossary of Terms Used in Petroleum Refining." This compilation of 2,000 terms, the work of several years, has been completed and approved and is now being printed. It will be available at a price of about $6 per copy in a few months. In addition to the approved definition and usage of each term, the glossary will include phonetic spelling and stenographic symbols.

Training . . . The committee on training has set up a Library of Training Literature which is located at the A.P.I. headquarters in New York. This collection of training manuals and aids is now 1 year old and the committee is actively soliciting all pertinent material from oil companies. The library is available for use by anyone who is interested, and a loan service is in effect for those who are unable to inspect it in person.

Vapor lock . . . A vapor lock survey, recently completed by the automotive research committee, was reported in a technical session at the recent meeting. This committee has no new research or survey projects planned at present, but is active in cooperating with the Coordination Research Council, composed of automotive and oil-industry representatives. Future work with C.R.C. will include further studies involving vapor lock and the need for higher engine tolerance for fuels of higher volatility in future cars.

Equipment . . . The committee on refinery equipment which sponsored the technical session on deterioration of metals, also supervises the specialized work of 16 subcommittees. At the present time, this group is actively concerned with steps which might be taken to make corrosion subcommittee work more effective. The growing interest in corrosion prevention indicates that this phase of work may well be expanded in the future.

Cox charts . . . A practical, modified Cox chart will be reproduced later this year by the A.P.I. Refining Division. Comprising data on vacuum distillation of petroleum hydrocarbons, this new chart has been improved to include more dependable data for use in converting from one set of pressure and temperature conditions to another.

Tracer analysis . . . The accurate analysis of trace materials in petroleum has become highly important because of the effect of very small concentrations of certain metals on catalytic conversion efficiencies. The committee on analytical research will devote added attention to new laboratory techniques for identifying and measuring these components.

Waste disposal . . . A broad field of pollution control is covered by the committee on disposal of refinery wastes. This group held a panel discussion on sludges and spent clays at the midyear meeting. In addition to maintaining and continually revising a series of five manuals on waste disposal, the committee cooperates with regional organizations working for better pollution control in streams and atmosphere. New attention is now being given to biological-oxidation techniques and their application to industrial-waste disposal. Development work on this entirely new approach to the problem is going forward, and when commercial application becomes feasible, pertinent information will be available to the oil industry.

Oil Imports Rise

March average up 41,000 bbl. daily over February

CRUDE from the Middle East accounted for 40.1 per cent of total crude imports for March in contrast with 19.5 per cent for March 1952, according to data compiled by the Census Bureau of the Department of Commerce.

Total imports of crude and products averaged 1,106,000 bbl. daily, up 41,000 bbl. daily from February but down 40,000 bbl. daily from January and under the December record total by 106,000 bbl. daily.

The increase over February was due to a gain in crude receipts amounting to 70,000 bbl. daily which was partly offset by a reduction in product imports of 29,000 bbl. daily.

Crude imports averaged 652,000 bbl. daily in March to set a new record. The previous record was made in December 1952 with an average for the month of 650,000 bbl. daily.

Imported crude has been separated into light and heavy since October 11, 1952. Since that time, heavy crude (under 25° gravity) has accounted for only 15.5 per cent of total crude imports. Heavy crude in March decreased in relative importance, accounting for only 11.3 per cent of total crude.

Crude imports from the Middle East averaged 261,000 bbl. daily in March compared with 171,000 bbl. daily in February and 233,000 bbl. daily last

December. Crude from the Middle East averaged only 89,800 bbl. daily for March 1952.

West Coast gains . . . Most of the gain in crude imports for March was on the West Coast. District 5 crude imports averaged 85,700 bbl. daily compared with 24,400 bbl. daily in February. East Coast receipts were up a little less than 10,000 bbl. daily.

Exports of crude and products, excluding shipments to territories, averaged 391,000 bbl. daily in March compared with 399,000 bbl. daily in February. Distillate exports decreased 28,000 bbl. daily from the postwar record established in February. Lube-oil and kerosine exports were at the highest levels since last August.

IMPORTS INTO CONTINENTAL UNITED STATES
(Thousands of barrels)

	Mar. 1953	Feb. 1953	Mar. 1952
Crude—			
Mexico	133	558	721
Colombia	1,082	1,533	1,472
Venezuela	9,616	8,735	8,811
Kuwait	3,903	2,287	939
Saudi Arabia	3,268	2,318	1,846
Iraq	343	187	
Qatar	593		
Canada	205	92	70
Far East	1,078	582	436
Total crude	20,221	16,292	14,295
Daily average	652	582	461
Products—			
Residual fuel	13,125	12,642	12,691
Other products	932	884	843
Total products	14,057	13,526	13,534
Daily average	454	483	437
Total all oils	34,278	29,818	27,829
Daily average	1,106	1,065	898

EXPORTS*

	Mar. 1953	Feb. 1953	Mar. 1952
Crude	2,171	2,011	2,939
Gasoline	2,504	2,339	1,896
Kerosine	727	376	652
Distillate fuel	3,072	3,568	1,292
Residual fuel	1,724	1,339	2,059
Lube oils	1,138	643	1,751
Other products	787	883	818
Total all oils	12,123	11,159	11,407
Daily average	391	399	368

*Excludes shipments to territories.

South Penn Plans Revealed

BRADFORD, Pa.—Capital expenditures of South Penn Oil Co. this year will total $8,000,000, with nearly a third of the amount to be devoted to improvements at Pennzoil Co.'s 8,500-bbl. refinery near Oil City.

George J. Hanks, chairman of the South Penn board, told the annual stockholders meeting here that $2,500,000 will be spent at the refinery for equipment to cut costs, improve products, and provide greater flexibility of operations.

Hanks said the company does not plan to increase production and actually contemplates a lower drilling rate, explaining that "there's already too much oil above ground" and declaring that Bradford crude already is on the "bargain counter" at $4.40 a barrel.

"Destruction of the export market" due to a huge refinery-building program abroad has intensified the present oversupply situation, the South Penn chairman said, but the next 6 months can see an improvement in the domestic industry if crude production and refinery runs are held to reasonable levels and the high rate of imports is reduced, he added.

Further increases in the price of Penn-Grade crude oil are necessary to insure satisfactory profits, he said, declaring that the price will be maintained as high as is "in line with the over-all picture."

Gulf Meeting Set

Production, engineering conclave to start May 25

PITTSBURGH, Pa.—Gulf Oil Corp. will kick off its seventh and largest production-engineering conference here May 25.

About 320 engineers, research scientists, technicians, and officials are expected to attend the 5-day conference from the company's producing divisions in the United States, Canada, South America, Europe, and the Middle East.

All topics covered . . . Those attending the conference will hear technical papers by 42 of their colleagues treating all major problems of producing oil. The group will meet at the William Penn Hotel.

In a well-completion practices forum, reports are scheduled on investigations of use of drilling mud thinners with a rotational viscometer, casing cementing practices, effect of oil-base mud on well completions, and evaluation of well performance. Reports also are to be given on the effect of free gas saturation on recovery by water flooding and on the performance of automatic control devices for pipe-line operations, newly developed by the company's research department.

Condensate field symposium . . . Exploitation of gas-condensate reservoirs and the behavior of materials in sour condensate wells will be discussed at a condensate field symposium. Other papers will include experiences in Kuwait with automatic and remote-control oil-handling equipment and with factors affecting potential and offtake from wells. A secondary recovery forum will include a paper on criteria for the selection of secondary-recovery operations and will continue with detailed reviews of secondary-recovery operations in the company's Houston, Tulsa, and Fort Worth divisions. Another report is on gas and water-injection projects in eastern Venezuela.

In Gulf's drilling-practices forum, experiences will be detailed with jet bits and hammer drill, tungsten carbide bits, and diamond drill bits. Review of mud problems in drilling deep wells, low-surface-tension drilling mud, and progress being made in overcoming lost circulation in drilling wells are to follow.

Another forum is scheduled on the legal aspects of unitization and the advantages of early unitization. Following papers deal with a comparison of artificial lift methods for deep horizons and evaluating oil possibilities of lost-circulation zones.

Drilling symposium . . . Three papers to be presented discuss drilling-cost trends throughout Gulf Oil Corp.—with the findings that although costs have risen they have been kept to a minimum by technological advances and increased efficiencies. An economic analysis of workover operations of old wells is made. Another talk is scheduled on electric-log interpretation.

WEST COAST

Drilling Suit May Be Heard

FRESNO, Calif.—Litigation between the city of Seal Beach, Calif., and Monterey Oil Co., as to whether the company's offshore drilling island is within the city's jurisdiction, may be heard by the Circuit Court of Appeals here late in May.

If the case cannot be heard at this session of the Fresno court it is believed likely Monterey will seek to have it come before the Circuit Court at San Diego.

Meanwhile the partially erected drill structure, 1½ miles offshore from Seal Beach, is solely a roost for sea gulls.

Work on the $1,000,000 island was suspended last fall when the city claimed it violated an antidrilling ban and that the company had not obtained a city building permit.

The city's claims were upheld by Superior Judge K. E. Morrison at Santa Ana last January.

Geophysicists' Problems

Permian Basin group discusses topics ranging from technical aspects of the profession to public relations, legal twists

Roy F. Carlson

MIDLAND, Tex.—Problems of geophysicists, ranging from technical aspects to those of public relations and land and legal problems, received an airing at the annual meeting of the Permian Basin Geophysical Society May 16.

Background geological information on the Permian geophysicist's province was provided by John Emery Adams, current president of the American Association of Petroleum Geologists, and senior geologist for Standard Oil Co. of Texas, Midland.

Beginning as a broad plain at the start of Ordovician time, Adams said, the area was a broad downwarp at mid-Ordovician. This depression was later divided into lobes by the folds, faults, or ridges that now constitute the Central basin platform of West Texas.

The widespread deep-seated early-formed limestones gave way later in geologic history to sands, shales, reef limestones, and evaporites that control the shallower pools in the Permian basin area.

Adams described the Delaware basin as having a tremendously thick sedimentary section, with rapid lithologic changes in some of the subsurface formations, and a thick clastic deposit on the surface, all of which complicate the work of geophysicists.

Shooting techniques . . . As one of the approaches to shooting in areas of these thick difficult-to-shoot surface formations, Lorenz Shock, Midland Geophysical Co., described investigations of multiple detonation of a series of small charges at a shot point as being a method of directing shot energy downward in a usable direction. These principles are being used currently in pattern shooting, he said.

A discussion and comparison of pattern shooting with regular shooting methods was given by Neal Clayton, Century Geophysical Co., Tulsa. The relative cost of pattern shooting compared to conventional shooting is not as great as is generally believed, Clayton said. He quoted a daily crew cost for pattern shooting at about $1,550, compared with $1,160 for conventional crews. The cost difference is largely due to the necessity of renting an extra reel truck and employing extra recording help.

Velocity changes . . . Rapid lateral variations in lithology give rise to equally as rapid changes in seismic velocity, and the practice of assuming unchanging velocities over wide distances will cause large errors, according to Joseph S. Pluta, Standard Oil Co. of Texas. Much field data is being collected, detailed calculations are being made, and mapping and survey work are being carried out in order to be able to predict or account for these velocity changes in the Permian basin.

John Daly, geophysical consultant in Midland, discussed methods of migrating dips to their true position in locating and detailing deep-seated structures. Early geophysical work in the Permian basin, Daly said, was devoted toward finding and outlining shallow and rather gentle structures while deeper structures were ignored. With deep structures with sharp dips, he said, it is necessary to migrate dips to their true position, shortcut computing methods being incorrect.

Public relations . . . Some method of contact between landowners and local people and the geophysical companies and their crews, and some degree of understanding between these people, must be reached if geophysical companies are to enjoy good public relations. According to Charles J. Deegan, Dallas petroleum consultant, the geophysical industry now has no personnel trained or qualified to establish such contact or relationship with the public. Further, Deegan said, it is necessary that the geophysical crews be given some standard of "good manners" or behavior for their conduct in the field.

Allowable Boosted

Texas to produce 58,684 bbl. daily more in June

AUSTIN.—The Texas Railroad Commission has set the state's oil-production allowable for June at 3,019,434 bbl. daily, an increase of 58,684 bbl. daily over the May 16 figure of 2,960,750 bbl. daily.

The increase will be effected by setting the statewide pattern at 20 producing days for the 30-day month compared with the same number of days in May, a 31-day month. East Texas will be permitted 18 producing days. Spraberry wells, producing under court order, will produce on a basis of 20 days.

The U. S. Bureau of Mines' estimate of market demand for Texas crude for each day during June was set at 2,780,000 bbl., down 20,000 bbl. daily from the May estimate. The bureau's weekly crude-oil stock report, dated May 15, indicated crude of domestic and foreign origin at the close of the week ended May 9 totaled 278,185,000 bbl., a decrease of 1,384,000 bbl. over the previous week. A decrease of 2,605,000 bbl. in domestic-crude stocks and an increase of 1,221,000 bbl. of foreign oil accounted for the net increase. Texas' crude stocks stood at 134,562,000 bbl. as of May 9, down 1,975,000 bbl. from the previous report but up 445,000 bbl. from same date last year.

The next allowable hearing will be held at the Commodore Perry Hotel here June 17, at 9 a.m.

CANADA

Quebec Refinery Planned

MONTREAL.—The Belgian company, Petrofina (Cia. Financiere Belge des Petroles, S.A.), has organized a Canadian subsidiary here to build a refinery in the Province of Quebec and carry on marketing of gasoline throughout eastern Canada.

A major part of the authorized capital of $25,000,000 will be reserved for the Canadian public. The Soc. Generale and the Banque Lambert, both of Brussels, will be associated with Petrofina in the new Canadian undertaking.

The new company is entirely separate from the Petrofina's exploration subsidiary, the Canadian Fina Oil Co., operating in western Canada. Petrofina is an important European refining and distributing company. It is exploring in Portuguese West Africa and has a large stock interest in Mexican American Independent Oil Co.

Pipe-Line Contract Let

SARNIA, Ont.—A contract to build Sun Oil Co.'s 200-mile petroleum-products line from Sarnia to Toronto has been awarded to Williams Bros. Pipe Line Contracting Co., Ltd., of Toronto.

The 8-in. line, to cost around $1,000,000, will pass through London and

Hamilton, where bulk stations will be provided. Capacity of the line will be 13,000 bbl. a day. Work will start in May, with completion scheduled to coincide with opening of the Sun refinery at Sarnia in October.

100th Well Completed

CALGARY. — The 100th commercial oil well has been completed in the Coleville heavy-oil field area of Saskatchewan by Royalite Oil Co., Ltd., and Canada Southern Oils, Ltd.

The well is Royalite Canada Southern 6-32 Coleville, completed on May 6. Royalite is the operator.

This event is of major importance to the two companies concerned, as it marks the culmination of a little less than 2 years of active exploration and development work in the Coleville area, and proves up additional Saskatchewan oil reserves. The discovery well, Royalite Canada Southern 1 Coleville, hit the top of the pay sand at a depth of 2,685 ft. on August 24, 1951. Since then development work has proceeded at a steady pace. Only one dry hole has been drilled to date in the area.

NATIONAL AFFAIRS

Tidelands Problems

Congress involved in wrangle over oil development; Senate plans own legislation to regulate Continental Shelf work

Bertram F. Linz

WASHINGTON.—Congress is getting itself involved in a new wrangle over the submerged lands, this time with respect to the development of oil in the Continental Shelf beyond the state boundaries.

The House has passed a bill providing for federal administration of the lands and the issuance of leases for oil and natural-gas development, which follows closely the provisions of the quitclaim bill the House passed April 1 and then scuttled in favor of the Senate bill to avoid another possible filibuster in the upper chamber.

New measure . . . The Senate, however, plans to enact its own legislation and the Interior Affairs committee has under consideration a measure introduced by Sen. Guy Cordon of Oregon.

The Cordon measure authorizes the Secretary of the Interior to prescribe the necessary rules and regulations for the leasing of the Continental Shelf's oil and gas reserves, but provides that the federal laws applicable to crimes and offenses on the high seas shall be applied to all acts occurring on drilling platforms or other structures not considered to be vessels.

The bill also would apply to these offshore developments the provisions of the Longshoreman's and Harbor Workers' Compensation Act, the Ship Mortgage Act, the National Labor Relations Act, and the Fair Labor Standards Act. It further would establish certain requirements with respect to the employment of aliens and apply import and export regulations, and give the Coast Guard authority to promulgate and enforce regulations with respect to lights and other warning devices, safety equipment and other matters relating to the promotion of safety of life and property.

Policing offshore . . . The two coastal states most immediately involved, Texas and Louisiana, have proposed that they be given the responsibility of policing activities on the Continental Shelf for which they would be compensated by being permitted to impose production or severance taxes.

In view of the leveling of "giveaway" charges against the Eisenhower administration, Congress is shying away from the original suggestion that the coastal states be given 37½ per cent of the revenues from the Continental Shelf, but it is said that in terms of dollars there is little to choose between the two proposals.

Tariff Would Affect TEL

WASHINGTON. — A sliding-scale tariff on imported lead as proposed in the Simpson bill to amend the Reciprocal Trade Agreements Act would seriously jeopardize the military supplies of tetraethyl lead and other lead products in the event of a national emergency, the House Ways and Means Committee was told last week by Joseph A. Costello, vice president of the Ethyl Corp.

The Simpson bill, which also includes provisions for the imposition of a quota on imports of foreign oil, would impose additional duties on imported lead whenever the domestic market price dropped below a base of 15½ cents per pound. Purpose of the provision is to protect the domestic lead producers, who are complaining they are being forced to close their mines because of low-priced lead imports.

Costello testified that the additional tax would not stabilize the supply of lead but would accentuate fluctuations in both price and supply, encourage speculation and disrupt the operations of lead consuming industries.

Costello explained that the United States depends upon imports for one-third to one-half of its lead supply and it is reasonable to expect that in any period when a substantial additional duty was imposed sellers of foreign metal would hold their lead off the market in anticipation of a resulting rise in price and consequent removal of the additional duty and then would dump the lead withheld plus their current production.

Under these circumstances, with the duty fixed quarterly, Costello said, the constant fluctuation in supply, duty, and price would disrupt normal buying practices. Ethyl Corp. and other users of lead would be required to speculate in the lead market, attempting to buy and build large inventories when the additional duty was not in effect and discontinuing purchases when it was imposed.

Taxpayers Get "Relief"

WASHINGTON.—The Internal Revenue Bureau last week took the first step toward reformation of tax policies promised by the Eisenhower administration.

Under a new rule, refiners and other taxpayers may now set rates of depreciation for their equipment and machinery and, if not contested by internal-revenue agents, those rates will not be disturbed from year to year.

Moving to end the confusion which has existed for years, Internal Revenue Commissioner T. Coleman Andrews pointed out that the purpose of the depreciation is to permit taxpayers to recover in annual installments the cost of the property used for the production of incomes and a difference of a few years in the determination of the useful life of the property was of no great importance taxwise.

Under the new policy, Andrews said, once agreement has been reached between the taxpayer and the bureau "it shall be the policy of the Internal Reveue Service generally not to disturb depreciation deductions, and revenue employes shall propose adjustments in the depreciation deductions only where there is a clear and convincing basis for the change.

World Output Slips

But drop in March is slight; production still is only 132,000 bbl. daily under all-time record set in December

Dahl M. Duff

NON-COMMUNIST world production of crude oil declined in March for the third successive month.

The decrease amounted to slightly more than 85,000 bbl. daily, or about 0.7 per cent, and was due to a substantial drop in output from fields in the United States.

Free World production reached an all-time peak of about 11,705,000 bbl. daily last December. Total March output was approximately 11,573,000 bbl. daily.

In January, United States production fell back from the December record, while foreign output increased. In February, a slight gain in domestic output failed to balance the production drop abroad. In March, the pattern was reversed with a slight foreign increase and a much larger decline in the United States.

For the first quarter of 1953, United States production averaged approximately 6,527,000 bbl. daily. This was 3.2 per cent over the average for the same 3 months of 1952. Non-Communist production abroad during the first quarter averaged about 5,120,000 bbl. daily, up 8.5 per cent from the corresponding period of 1952.

The change from February to March in the United States was a decrease of 98,000 bbl. daily. March domestic production was only 76,000 bbl. daily, or 1.2 per cent, over March 1952. Foreign output rose about 12,500 bbl. daily from February to March, and in the latter month, the average represented an increase of 6.1 per cent over March 1952.

The increase in foreign crude output from February to March was due largely to another slight rise in production in the Middle East. This brought the total to 2,265,000 bbl. daily, the third successive monthly producing record for this prolific region. Production in the Western Hemisphere, outside the United States, was virtually unchanged.

Latin America . . . Venezuela's crude output remained at a low level for the second consecutive month. The March average of 1,717,000 bbl. daily compared with a 1952 average of 1,805,000 bbl. daily and the December peak of 1,861,000 bbl. daily. An official of a leading producing company ascribed the reduction to slack market conditions, partly seasonal.

Venezuelan production by weeks during March was: week ended March 2, 1,705,200 bbl. daily; March 9, 1,706,400 bbl. daily; March 16, 1,683,800 bbl. daily; March 23, 1,713,300 bbl. daily; and March 30, 1,762,500 bbl. daily.

Production in Colombia was at a new all-time high in March. The average was 113,185 bbl. daily, not including about 2,350 bbl. daily of condensate. Production by companies was: Shell, 48,629 bbl. daily; Empresa, 34,395 bbl. daily; Texas 4,936 bbl. daily; and Colpet, 25,225 bbl. daily.

Europe . . . West German crude production continued its steady climb. Small increases have raised to total to new highs month after month for the last several years. The daily average is now nearing the 40,000 bbl. mark. Output in the Netherlands the second major producer in Europe, increased sharply in March following a decline the previous month due to the floods which caused a refinery and field shut down for a few days.

Middle East . . . In the Middle East total production in March gained about 6,600 bbl. daily over the previous month. A decline in Kuwait was more than offset by increases in the Iraq and Saudi Arabia.

Of interest is the fact that production in Kuwait and Saudi Arabia was practically the same during the first quarter. First-quarter output in Saudi Arabia was 792,500 bbl. daily. Since the nationalization in Iran, this country has led the Middle East and held a position as the world's fourth largest

WORLD PRODUCTION

(In thousands of barrels daily)

Country—	March 1953	Feb. 1953	March 1952
W. Hemisphere:			
Argentina	80.0	79.3	66.6
Bolivia	1.4	1.3	1.5
Brazil	2.7	2.7	2.0
Canada	162.0	164.0	116.8
Chile	3.1	2.9	2.2
Colombia	113.2	109.0	104.4
Cuba	0.1	0.1	0.1
Ecuador	7.8	7.8	7.6
Mexico	214.0	217.3	214.5
Peru	46.0	46.0	44.5
Trinidad	60.0	59.7	57.4
Venezuela	1,717.0	1,717.1	1,819.9
Total	2,407.3	2,407.2	2,437.5
Europe, N. Africa:			
Algeria	1.3	1.3	0.7
France	7.0	7.0	6.7
French Morocco	2.1	2.1	2.2
W. Germany	39.3	38.0	31.8
Italy	2.0	1.9	1.2
Netherlands	15.5	10.9	14.1
Egypt	46.0	46.9	45.1
United Kingdom	1.1	1.1	1.1
Total	114.3	109.2	102.9
Middle East:			
Bahrein	30.1	30.0	29.2
Iran	25.0	25.0	27.3
Iraq	559.3	529.9	266.0
Kuwait	771.0	796.9	784.0
Qatar	74.9	83.7	68.1
Saudi Arabia	804.2	792.4	821.4
Turkey	0.5	0.5	0.3
Total	2,265.0	2,258.4	1,996.3

Country—	March 1953	Feb. 1953	March 1952
Other Asia:			
British Borneo	104.0	104.0	106.6
Burma	2.5	2.5	2.2
India	6.0	6.0	5.0
Indonesia	195.0	195.0	148.7
Japan	5.9	5.9	6.1
New Guinea	4.9	5.1	4.6
Pakistan	4.5	4.5	3.8
Total	322.8	322.0	277.0
Total non-Communist foreign	5,109.4	5,096.8	4,813.7
U. States	6,464.0	6,562.0	6,388.0
Total, Free World	11,573.4	11,658.8	11,201.7
Est. Russia and E. Europe:			
Austria (Soviet Zone)	60.0	60.0	50.0
Romania	80.0	80.0	80.0
Russia	1,010.0	1,010.0	900.0
Other Communist	28.8	28.8	28.0
Total	1,178.8	1,178.8	1,058.0
World total	12,752.2	12,837.6	12,259.7

Figures are from reliable reports in the industry or official government sources. Data for Russia and Eastern Europe are based on competent estimates; no authentic information is available on month-to-month production in these areas. Completely current reports also are lacking for certain countries of Southeast Asia. Data for earlier months have been revised where necessary.

TREND OVER THE LAST YEAR

(Thousands of barrels daily)

1952	Western Hemisphere less U.S.	Middle East	Total foreign less Russia and satellites
April	2,459.6	2,090.8	4,933.2
May	2,527.6	2,142.1	5,059.9
June	2,517.8	2,208.9	5,117.6
July	2,495.0	2,126.1	5,018.7
August	2,425.5	2,091.7	4,921.7
September	2,417.8	2,168.2	4,994.8
October	2,455.8	2,175.1	5,047.2
November	2,504.9	2,174.7	5,098.7
December	2,561.3	2,092.1	5,075.0
1953			
January	2,472.8	2,252.3	5,152.2
February	2,407.2	2,258.4	5,096.8
March	2,407.3	2,265.0	5,109.4

oil-producing country, after the United States, Venezuela, and Russia.

Kuwait's first quarter output was figured at 791,500 bbl. daily. Kuwait production figures are announced in long tons, and some differences arise in the barrel conversion depending on what gravity and conversion factors are used.

Some revisions were made in the March crude production attributed to the various Communist satellites of Russia. The main change was in Hungary which is now believed to be producing around 15,000 bbl. daily. Some reports recently received suggest Hungarian production is much higher, possibly in the 28,000 bbl. daily, range, due to rapid exploitation of a new field discovered last summer. Only minor amounts of crude oil are produced in the other Communist countries of eastern Europe and in China.

LATIN AMERICA

New Oil Discovery

Venezuelan Petroleum hits with its Barinas wildcat

AN oil discovery in the State of Barinas in southwestern Venezuela has been announced by Venezuelan Petroleum Co. (86 per cent owned by Sinclair Oil Corp.).

A company announcement said its Barinas wildcat on test produced at a rate of 312 bbl. daily of 27.5°-gravity crude from a sand at 9,140 ft. and at a rate of approximately 600 bbl. daily of the same gravity oil from a sand at 8,986 ft.

Testing is continuing; production is shut in on account of the lack of an outlet. Additional wells are planned, the company said, to ascertain if the productive sands continue beyond the immediately proven area. No further information was officially released.

Near Socony wells . . . The well, Sinco 1, was earlier reported as being located about 4 miles south of the shut-in Barinas producers of Socony-Vacuum Oil Co., Inc. *(The Oil and Gas Journal, May 18, page 227).*

Socony completed six productive wells on its Barinas acreage several years ago but subsequently closed them in and discontinued the operation. Although considerable geological and geophysical work is being done in the Barinas basin, major commercial production would require an expensive pipe line to the Caribbean Coast. Such a line would be about 240 miles in length and terminate probably at Puerto Caballo.

Venezuelan Petroleum last year had a production of 10,611 bbl. daily, all in Eastern Venezuela. During the year the company drilled three wildcat failures in the State of Guarico and one success, Roblote 1, in the State of Anzoategui. The Barinas well is about 450 air miles west of Santa Barbara field in Eastern Venezuela.

Argentine Oil Discovery

A new field discovery is reported to have been made by Yacimientos Petroliferos Fiscales at Madre Jones in Salta Province near the Bolivian border in Argentina.

The discovery well at Madre Jones was said to have produced at a rate of 500 cu. m., or about 3,150 bbl. daily, of light crude along with a million cubic feet of gas. Argentine sources said the field surpassed in importance the 1950 Campo Duran discovery location 30 miles distant in the same province.

Plans were being made to move the Madre Jones crude through a 5-mile pipe line to a railhead at Salvador Mazza and then several hundred miles by tank car to the San Lorenzo refinery.

The new discovery was expected to expedite the government's plans for a direct pipe-line connection from Salta field to San Lorenzo. Argentina's present production is about 75,000 bbl. daily. The government's 5-year plan calls for an increase to about 125,000 bbl. daily by 1957.

MIDDLE EAST

Japs Taking Oil

Another tanker is on way to pick up Iranian crude

THE Japanese tanker Nissyo Maru left Tokyo May 14 to pick up a second cargo of nationalized Iranian oil for the unaffiliated Idemitsu Kosan company.

The Japanese company was undaunted by the fact that Anglo-Iranian Oil Co., Ltd., a few days earlier filed an ownership suit against the first Iranian oil purchase. Idemitsu also faces the opposition of its own government which has taken steps to prevent such shipments.

The Idemitsu company has a credit of nearly $1,000,000 in unused dollar allocation for oil purchases. The Japanese Government has told Britain that future currency allocations for oil purchases would be made in a manner to prevent any further Iranian shipments. The current Idemitsu allocation, however, is not subject to these restrictions, and Tokyo said it was powerless to block these purchases.

Russians interested . . . A Japanese newspaper reported without confirmation that Russian Government representatives had approached three Japanese oil firms with offers to supply 100,000 tons of oil per year over a 5-year period in exchange for various Japanese products. This amount would be equivalent to an average of about 2,000 bbl. daily.

This report created a stir in the Japanese petroleum industry which was already concerned over the possibility that the Idemitsu company may undersell the market with Iranian products if it is successful in defending itself against the Anglo-Iranian court action.

Another unconfirmed report circulating in Tokyo was that the Shell organization had notified Japanese refineries it would sell Middle East crude 20 per cent below prevailing price levels. Industry officials, discounting this report, pointed out that recent reductions in tanker charter rates have cut the laid-down price of oil in Japan though the Persian Gulf market is unchanged.

International Briefs

A deep wildcat projected to the 10,000-ft. range has been started in southern Germany by an affiliate of Socony-Vacuum Oil Co., Inc. The location is near Ampfing, about 45 miles east of Munich in the Inn district of Bavaria, on a structure found by reflection seismograph. The operator is Bayerische Mineral-Industrie, A.G., which jointly owns the concession with the other German companies, Preussag and Gewerkschaft Elwerath.

Trinidad Leaseholds, Ltd., leading producer and refiner in Trinidad, has organized a new subsidiary to produce industrial chemicals. Plant and equipment worth $1,500,000 is under construction at Pointe-a-Pierre where T.L.L. operates an 85,000-bbl. daily refinery.

Union Executive

Grinsfelder is veteran of 3 decades with firm

SAM GRINSFELDER, 55, vice president in charge of field operations for Union Oil Co. of California, Los Angeles, is a veteran of more than 3 decades' service with the company.

He is a native of Spokane, Wash., and received his degree in mining engineering from the University of California. After spending 2 years as a mining engineer for Shasta Zinc & Copper Co., and a year with the Bureau of Mines, he joined Union in 1922 as a geologist at Denver.

He served as district petroleum engineer at Fort Collins, Colo., and in 1928 was transferred to Abilene, Tex., as assistant to the manager of the Rocky Mountain division, in charge of Texas operations. In 1934 he was named development engineer at Los Angeles, and the following year became division petroleum engineer at Dominguez, Calif.

He returned to Texas in 1939 as manager of Texas-Gulf operations. In 1944 he was promoted to vice president of the Houston area. He assumed his duties in the general offices in 1946.

An active member of the American Petroleum Institute, he assisted in the formation of the Rocky Mountain district of the A.P.I. production division. He is a member of the American Association of Petroleum Geologists and the American Institute of Mining and Metallurgical Engineers.

W. Alton Jones has been elevated from president to chairman of the board of Cities Service Co. **Burl S. Watson,** who has been executive vice president, has been named to succeed Jones as president. Jones has been president since 1940.

Jack D. Brown, district civil engineer for Humble Oil & Refining Co., has been transferred from the Odessa district to the Wink district in the same capacity. Other transfers include: **George F. Daugherty,** Wink district civil engineer, named Hobbs district civil engineer; **L. G. Harris,** Hobbs district civil engineer, appointed Means district civil engineer; and **A. V. Lockett,** Means district civil engineer, named Odessa district civil engineer. **Joe E. Graham** has resigned as supervising petroleum engineer at Midland to join DeGolyer & MacNaughton.

R. J. Benda has been appointed general superintendent for Great Lakes Pipe Line Co., Kansas City. Since January 1951 he has been assistant to the chief engineer at Kansas City. He joined the firm in 1933 following his graduation from the University of Iowa.

H. K. Griffin, Meridian, Miss., vice president of the Mississippi Valley Gas Co., has been elected president of the Southern Gas Association. Other officers elected recently at the annual convention in New Orleans, include: **C. I. Wall,** Lubbock, Tex., first vice president; **J. H. Collins, Sr.,** New Orleans, second vice president; **H. V. McConkey,** Dallas, treasurer, and **Earl J. Newlin,** Oklahoma City, secretary. New directors include: **Carl E. Cloud,** Little Rock, Ark.; **C. L. Perkins,** El Paso, Tex.; **Charles K. Oxford,** Columbus, Ga.; **Joseph A. Davis,** Fort Worth; and **E. G. Hotze,** Tulsa.

Al W. White has resigned from Fain & McGaha, Wichita Falls, Tex., to become an independent consulting geologist in Wichita Falls.

Norman H. Ricker, senior research physicist for Carter Oil Co., has been elected president of the Geophysical Society of Tulsa. Other officers are: **John M. Crawford,** director of geophysical development and research, Continental Oil Co., first vice president; **R. W. Mossman,** chief geophysicist, Seismograph Service Corp., Tulsa, second vice president; **Tom F. Southgate,** chief computer, Amerada Petroleum Corp., secretary; and **David R. Weichert,** field supervisor, Century Geophysical Corp. With the exception of Crawford, who is from Ponca City, all are of Tulsa.

Neal H. Hilton, Jr., geologist for Caltex Oil Co., has been assigned to a post in Sumatra. He worked for Caltex in California, Texas, and New York since his graduation from Colorado School of Mines in 1951.

Emmett Scott Carmichael, technical assistant to the director of Socony-Vacuum Laboratories, Brooklyn, has been elected chairman of the New York sec-

Pipe-Line Construction Men Attend I.P.E.

Pipe-line-construction executives attending the International Petroleum Exposition last week in Tulsa, were, left to right: O. E. Murrey, Midwestern Engine & Equipment Co., Tulsa; G. G. Griffis, G. G. Griffis Construction Co., Tulsa; Clark C. Bledsoe, Midwestern Constructors, Inc., Tulsa; R. W. Harris, El Paso Natural Gas Co., El Paso, Tex.; C. A. McReynolds, Northern Natural Gas Co., Omaha; and J. D. Cummings, Crutcher-Rolfs-Cummings, Inc., Houston.

PERSONALS

A.P.I. Refining Committee Leadership

These men, who head the general committee of the American Petroleum Institute Division of Refining, are pictured as they attended a recent meeting of the division in New York. Left to right, they are: John W. Newton, vice president of Magnolia Petroleum Co., Beaumont, Tex., chairman and A.P.I. vice president for refining; E. B. McConnell, vice president of Standard Oil Co. (Ohio), Cleveland, vice chairman; Harold G. Osborn, vice president of Continental Oil Co., Ponca City, Okla., secretary; and W. T. Gunn, A.P.I. director of refining, New York.

tion of the American Chemical Society. He will take office July 1, succeeding **Prof. Edward J. Durham** of New York University. Also elected were: **Prof. Arthur B. Kemper,** Manhattan College, secretary; **Fisher Gaffin,** treasurer; and **Prof. Warren M. Sperry,** New York State Psychiatric Institute, chairman-elect. **Dr. Alvan H. Tenney** and **Dr. Wayne E. Kuhn** were elected directors.

J. W. MILLER

John W. Miller has been appointed manager of the export department of Creole Petroleum Corp. at New York. He has been assistant manager since 1949. He has been associated with Creole and other affiliated companies of Standard Oil Co. (N.J.) since 1934. His former positions include that of technical supervisor at Creole's Caripito refinery in Venezuela. **Robert W. Miller,** former manager, will devote his entire attention to duties as vice president and director for Creole.

Earl L. Spieles, production engineer for Ohio Oil Co., has been transferred from Lovell, Wyo., to Casper.

V. A. Fogg, head of the bulk-fuels division of the Cooperative G.L.F. Exchange, Ithaca, N. Y., has been granted a leave of absence to devote full time to the presidency of Texas City Refining Co.

Richard Porter has been appointed area gas engineer for Shell Oil Co. at New Orleans. For the past 2 years he has been in Shell's New York office.

Floyd Brady, tool pusher for Cron & Gracey Drilling Corp., has been transferred from Morgan City to New Iberia, La.

C. M. Ross, seismic party chief for Amerada Petroleum Corp., has been transferred from Ardmore to Chickasha, Okla.

N. D. Clark has resigned as head geologist for John Lindas Oil Co., Inc., to become an independent consulting geologist at Wichita.

Paul E. Fitzgerald, geologist and head of public relations for Dowell, Incorporated, has been elected president of the Tulsa Geological Society. He succeeds **Daniel A. Busch,** Zephyr Drilling Co. Other officers are: **H. T. Morley,** chief geologist for Stanolind Oil & Gas Co., first vice president; **Philip C. Ingalls,** exploration editor, The Oil and Gas Journal, second vice president; **Mrs. S. Grace Hower,** Amerada Petroleum Corp., secretary-treasurer; **Mrs. H. V. P. Branson,** Shell Oil Co., reelected editor of the TGS Digest; and **Earl T. Peterson,** Atlantic Refining Co., business manager of the digest. New councilmen are: **Paul L. Lyons,** Anchor Petroleum Co.; **Erick Waering,** Helmerich & Payne, Inc., and **S. Morse Willis,** consultant.

W. E. Mueller, Colorado Springs, Colo., and **Mark Millard,** New York, have been elected new members of the board of directors of Colorado Interstate Gas Co., Colorado Springs. Mueller is executive vice president of the company, and Millard is a partner of Carl M. Loeb Rhoades & Co., in New York.

John E. Allen, New Mexico Bureau of Mines and Mineral Resources, has been elected president of the New Mexico Geological Society. Other officers are: **Phil T. Hayes,** U. S. Geological Survey, secretary, and **Ross Johnson,** U. S. Geological Survey, treasurer.

Gail A. Barry has resigned as petroleum geologist for William H. Spice, Jr., San Antonio, Tex., petroleum consulting firm, to join **Paul J. Moore,** petroleum consultant as a partner. The new firm will be called Barry & Moore, Petroleum Consultants, and will maintain offices in San Antonio.

G. A. BARRY

PAUL J. MOORE

V. W. Finch, geologist for Shell Oil Co., has been transferred from the Los Angeles area offices to Seattle, where he is exploration manager of the Alaska division. Other changes in the area exploration department include: **H. L. Popenoe, Jr.,** formerly district geologist at Ventura, Calif., moved to Los Angeles as senior geologist, and **S. R. Jeffreys,** promoted from geologist in the coastal division at Ventura to district geologist. **R. M. Hippard,** Shell production engineer, has been transferred from the Midland, Tex., area to Ventura.

John A. Welch and **H. T. Goss,** vice president of the newly formed Arkansas Fuel Oil Corp., Shreveport, have been named special advisers to the president. Welch also will continue as manager of the corporation's marketing division. **P. H. DuVal,** vice president of the subsidiary, Arkansas Pipeline Corp., and manager of Arkansas Fuel's oil pipe-line division, has been

PERSONALS

assigned additional duties in purchase and sales. **L. F. Babcock** has been promoted from assistant chief engineer to chief engineer for Arkansas Fuel, and **S. D. Armstrong** has been promoted to chief civil engineer. **Colonel J. Russell** has been promoted from petroleum engineer in the oil-production division to acting chief production engineer.

Douglas Getty of Southwest Paving Co., has been elected a member of the board of directors of Exeter Oil Co. He replaces **Robert P. Casey,** who has resigned.

D. B. Edwards, chief plant engineer in the producing department of Stanolind Oil & Gas Co.'s general office at Tulsa, has been appointed assistant sales superintendent. **E. W. Kilgren,** gas development supervisor, has been named to succeed Edwards. **R. L. Marek,** former superintendent of crude-oil sales, has been named gas sales superintendent succeeding **S. C. Barrett,** who recently resigned.

V. M. Wann has been appointed resident engineer of the refinery Standard Oil Co. (Ind.) is building in Mandan, N. D. Since 1946 he has been design engineer at Standard's Whiting, Ind., refinery. Previously he was a hydraulic engineer for the U. S. Geological Survey at Indianapolis, Ind.

J. W. Ferguson has been promoted from senior analyst to the newly created position of assistant manager of Continental Oil Co.'s coordinating and planning department at Houston. He was senior natural-gas engineer for the U. S. Bureau of Mines for 6 years before joining Conoco at Houston last year.

Charles W. Schneider, Louisville, Ky., has been elected a vice president and executive-committee member of Standard Oil Co. of Kentucky to succeed the late Willis F. Roth. Schneider was elected a director and appointed director of operations in 1949. **W. C. Smith,** Louisville, was elected a director to fill the vacancy created by Roth's death, and also was named assistant to the president. Smith formerly was executive assistant.

J. A. Martin, formerly production superintendent for Lucerne Corp. at DeQuincy, La., has been named drilling superintendent and vice president for Clinch Drilling Co. at Jackson, Miss.

R. D. (Bert) Townsend, formerly assistant manager of Rocky Mountain operations for General Petroleum Corp. at Casper, Wyo., has been appointed assistant to the executive vice president. His headquarters will be in Salt Lake City.

Richard J. Sullivan has resigned as a petroleum engineer in West Texas for Stanolind Oil & Gas Co. to become an engineering consultant at Midland, Tex. He received his petroleum-engineering degree from Texas A. & M. College and a master's degree from Louisiana State University.

Curtis H. Johnson, formerly assistant chief geophysicist for General Petroleum Corp. at Los Angeles, has been named manager of a newly formed marine division for Geophysical Service, Inc., at Dallas. For the past 3 years he has been a member of the offshore seismic committee of the Western Oil and Gas Association.

William E. V. Abraham, managing director of Burmah Oil Co. and its subsidiaries, has been appointed a member of the board of directors of Anglo-Iranian Oil Co. Abraham, who is 55, has been in the service of Burmah Oil Co. since 1920.

Clyde Brown, who has been associated with Continental Oil Co.'s oil and gas-production operations since 1937, has been promoted to proration engineer for the company's southern region. His headquarters will be in Houston. **C. B. Hickernell** and **Howard C. Briggs** have been promoted to assistants to the general managers of the southern and western regions, respectively.

DEATHS

Beman G. Dawes, the first president of Pure Oil Co., and a director since the company's beginning in 1914, died May 15 at his home in Licking County, Ohio, near Newark. In 1924 he was named chairman of the board, a position he held for 23 years, and in 1947 he became a member of the company's executive committee.

Mark Shields, 63, retired executive secretary of the Pennsylvania Natural Gas Men's Association, died May 13 at Pittsburgh.

Benjamin Swan, Sr., 65, former foreman at the Bayway refinery of Esso Standard Oil Co. at Linden, N. J., died May 12 at Elizabeth, N. J.

Frank S. Haire, 82, retired foreman for Oil Well Supply Co., died May 15 at his home in Tulsa.

James Gregory Rowe, Jr., about 48, Wichita Falls, Tex., executive in the land division of Humble Oil & Refining Co., died May 15.

Dean A. Strickland, 53, general sales manager for the Texas distribution division of United Gas Corp., died at Shreveport recently. He was a director and former president of Southern Gas Association.

Willard E. Wilson, 52, machinist inspector for Mid-Continent Petroleum Corp., died May 19 at Tulsa.

Marrs McLean, 69, oil producer since 1910, died at San Antonio, Tex., May 18. He was a charter member of the Independent Petroleum Association.

Will Mee, Standish, Mich., oil producer, died May 16 at his home in Standish.

George E. Ault, general superintendent for Skelly Oil Co.'s pipe-line department in Kansas and Nebraska, died May 11 at St. Louis. He had been with Skelly since 1927.

A. F. Winn, 73, former traffic manager for Skelly Oil Co., died May 18 at Rogers, Ark. He served as traffic manager from 1923 until his retirement in 1951.

George R. Spinney, 90, retired independent operator, died May 19 in a Tulsa hospital.

In this aerial photo of the McKamie plant all of the major process equipment is new with the exception of the three fractionating towers at the extreme right of the process area and the large cooling tower. These latter items were incorporated from the old plant.

History of McKamie Plant

THE plant operated by the McKamie Gas Cleaning Co. is located in Section 21-17s-23w, Lafayette County, Arkansas. This location is adjacent to the unitized McKamie-Patton pool in the southwest part of the state.

The McKamie-Patton Smackover lime pool was discovered in 1940 and in the early years of its life consisted mainly of production from a gas phase zone which produced gas and condensate at a ratio of about 10,000 cu. ft. per barrel. Initially the lease installations included three separators and lease storage with separator gas going through three gathering systems to the plant and the condensate run direct from the leases.

The original plant built by McKamie Gas Cleaning Co. in 1942 handled the gas gathered by these three systems at pressures of approximately 600 psi., 100 psi., and atmospheric pressure. That plant at contact pressure of 600 psi. removed hydrogen sulfide and CO_2 from the field gases and extracted butane and natural gasoline. Its capacity was rated at 25 million cubic feet per day.

In 1948, operators in McKamie-Patton pool, which at that time had developed into a combination gas-condensate reservoir with an oil rim, agreed that unitization with pressure maintenance was the best future course from the standpoint of conservation and maximum recovery. The pool was unitized December 1, 1948, and immediately work was started on the installation of compressors for injection of gas into the reservoir.

The compressor plant which was started up in August 1949 was so designed that initially it was capable of handling 35 million cubic feet per day of gas including the 600-lb. residue from the then existing McKamie plant. Simultaneously with this work, engineering and design went ahead on a plan for enlargement of the processing facilities to provide a capacity of 50,000,000 cu. ft. per day at contact pressures elevated to 1,500 psi.

New McKamie Processing Facilities

THE enlarged McKamie plant, which began operation in April 1951 is designed to fulfill four important functions:

1. Gas and liquid sweetening.
2. Distillate stabilization.
3. Absorption recovery of natural gasoline and L.P.G. fractions.
4. Gas dehydration and injection.

An acid-gas stream from the McKamie plant is piped to the adjacent Mathieson Chemical Corp. plant for sulfur recovery.

Plant design and construction were supervised by a plant committee with representatives from Atlantic Refining Co., Carter Oil Co., Bodcaw Oil Co., Sinclair Oil & Gas Co., and Sohio Oil Co., with P. D. Baker of Carter as chairman of the committee.

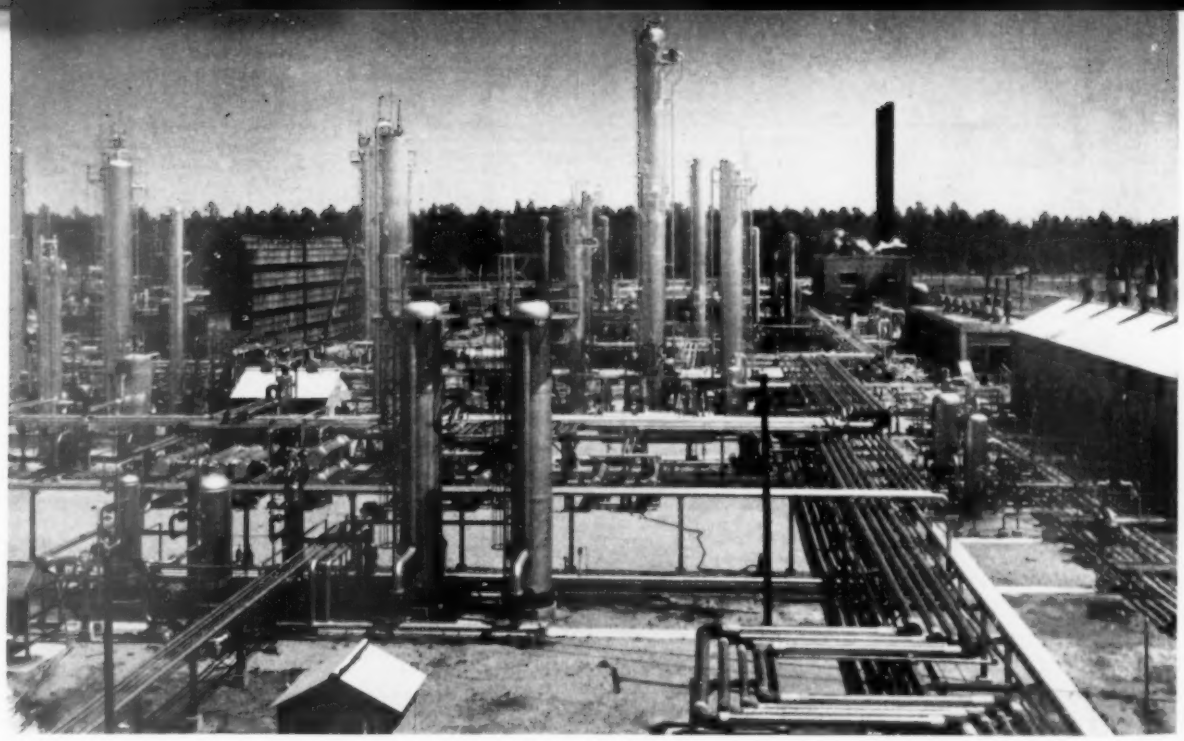
New and enlarged facilities of the McKamie plant have more than doubled the original capacity of 25,000,000 s.c.f.d. One interesting feature of the plant is the new high-pressure gas-desulfurization section which operates at above 1,400 psi. This is the highest-pressure Girbotol unit in operation. The plant is also one of the relatively few in operation today in which the effluent sweet gases and liquids pass directly to oil-absorption columns or distillation units.

Three gathering systems feed the plant from the field. Gas-condensate wells feed both gas and condensate direct to the plant through a 1,500 psi. system of flow lines and manifold stations. Oil-well gas flows from field separators to two systems, one operating at 450 psi. and the other at 125 psi. depending on the individual oil well's capability produced against pressure.

New Processing

In 1949 the compressor equipment amounting to 4,800 hp. was installed and interim operation was conducted on 35 to 36 M.M.s.c.f.d. on 600-psi. gas. However, compressor design was such that by making clearance-pocket changes conversion at a later date to 1,500-psi. operation was readily accomplished and compressor capacity was increased to the current 50 M.M.s.c.f.d.

In the present operation 1,500-psi. distillate goes through several flashes and is stabilized in a plant column. The sour gas from the primary or 1,430-psi. flash goes to the high-pressure Girbotol unit and then to high-pressure (1,420-psi.) absorption. Vapors taken overhead from the distillate stabilizer together with gas from the 450-psi. and 125-psi. field gathering systems go to the low-pressure (425-psi.) amine de-



Desulfurization, distillate stabilization, liquids extraction, dehydration, and residue-gas injection are combined in McKamie field plant facilities.

Operating at 50 Million Cubic Feet Daily

Operations combine highest-pressure desulfurization, distillate stabilization, liquids extraction, and gas dehydration and injection in McKamie pool plant

by K. G. Pearce*

sulfurization and then to the low-pressure absorber.

Additional fractionator capacity was installed. Until recently propane was not recovered, the liquid net overhead product of the depropanizer being returned back to the field with the injection gas.

Current production . . . The McKamie plant's current capacity of approximately 50,000 M.c.f. of gas per day is composed of some 36,500,000 cu. ft. of high-pressure (1,450-psi.) gas, 3,300,000 cu. ft. of plant flash gases, 7,600,000 cu. ft. of 450-psi. or "A" stream gas, and 2,600,000 cu. ft. of 125-psi. or "B" stream gas. In addition to these produced and flashed gases, some 20,000,000 to 22,000,000 cu. ft. of dry gas from a utility company is compressed and injected along with plant residue.

The current production is approximately 45,000 to 47,000 gal. per day of a 28-lb. R.v.p. product consisting of the natural-gasoline fractions and normal butanes, 13,500 to 14,500 gal. per day of isobutane, and 16,000 to 18,000 gal. of propane. Design production of stabilized distillate is approximately 150,000 gal. per day.

Design analysis for total incoming raw gas to the plant including the 1,450-psi. stream from gas-distillate wells plus the raw "A" and "B" gas streams is as follows:

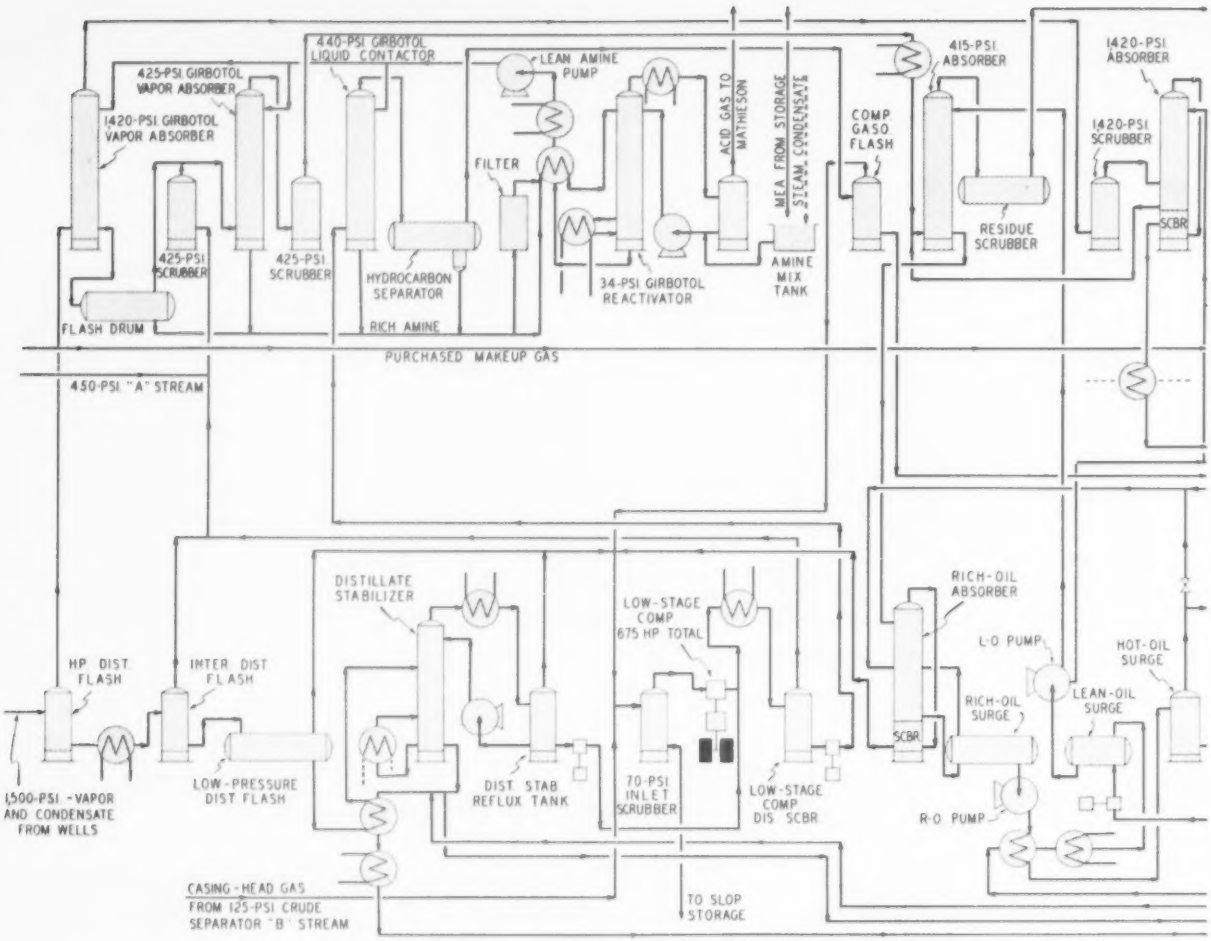
Component	Mol per cent
N_2	13.49
CO_2	5.97
H_2S	6.61
C_1	56.07
C_2	5.84
C_3	2.82
$i\text{-}C_4$	0.98
$n\text{-}C_4$	1.70
$i\text{-}C_5$	0.86
$n\text{-}C_5$	0.75
C_6	0.93
C_7 plus	3.98

More on McKamie Processing

1. Gas and liquid sweetening . . . The amine-sweetening unit in the McKamie plant is of Girdler Corp. design. The unit consists of a 1,430-psi. gas contactor, 425-psi. contactor, 440-psi. liquid contactor, with a reactivator and necessary reboilers, exchangers, coolers, pumps, and related equipment. The 1,500-psi. distillate is flashed successively at the plant to approximately 430 and 110-psi. The 1,500-psi. sour gas, containing some 3,650 grains of H_2S per 100 s.c.f., flows through the high-pressure contactor countercurrent to the monoethanolamine solution. The effluent gas from that contactor is sweet, containing between 0.25 and 0.4 grains of H_2S per 100 s.c.f.

The 450-psi. field separator or "A" stream gas, containing 4,300 grains of H_2S per 100 s.c.f. (7 per cent by volume), enters the plant and is augmented by the 125-lb. separator or "B" stream gas, containing some 5,800 grains of H_2S per 100 s.c.f. (9 per cent by volume), which has been compressed in two stages to "A" stream pressure. This "A" and "B" stream gas then flows countercurrent to the amine solution through the 425-lb. contactor, emerging with a hydrogen sulfide content of less than 1.5 grains of H_2S per 100 s.c.f.

*Assistant plant manager, McKamie Gas Cleaning Co.



Process steps in the enlarged multifunction plant operated by McKamie Gas Cleaning Co. in conjunction

The liquid contactor is used to sweeten the compression gasoline, the distillate stabilizer net overhead product, and other liquid streams that are further processed for natural gasoline or L.P.G. recovery.

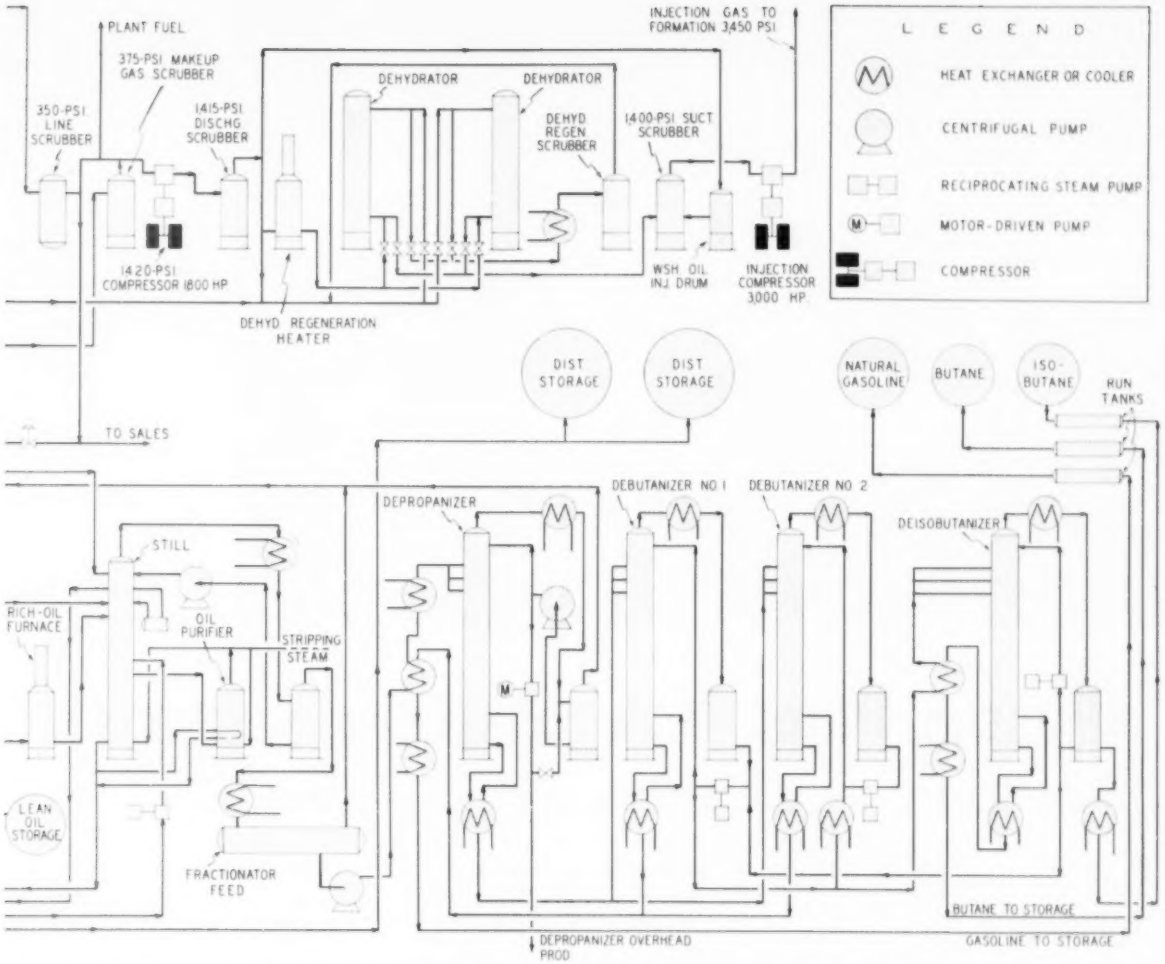
Sulfur recovery . . . The rich amine stream, containing 2,050 grains of hydrogen sulfide per gallon, is reactivated and stripped to a H_2S content of approximately 50 grains per gallon and is ready to recycle. The acid gas overhead from the reactivator, some 5,500 M.c.f.d. containing 38,000 grains per 100 s.c.f. and consisting of approximately 60 per cent H_2S and 35 per cent CO_2 by volume, is cooled and piped to a sulfur plant adjacent to the McKamie plant property for liquid sulfur manufacture.

Corrosion problem . . . In an operation of this type, corrosion is severe, especially so on heat exchange with the rich or saturated monoethanolamine solution. The reboiler and exchanger bundles are 304 stainless steel and the rich solution weight is kept at not greater than 4½ to 5 cu. ft. of acid gas per gallon of circulating fluid. A gunite-lined reactivator packed with Raschig rings is employed. Experience has also taught that the optimum solution strength for efficient operation and minimum foaming within the columns is 15 per cent monoethanolamine. Foaming at this concentration also appears to be less at heats above 168° F.

2. Distillate stabilization . . . The distillate, after the primary or 1,430-psi. flash, is successively flashed at 425 and 110-psi. respectively. It is heated to about 225° F. by exchange with distillate stabilizer bottoms and is stabilized in a 10-tray column.

The main stream of sour stabilized distillate is cooled and flows to storage tanks. The net overhead from the stabilizer is pumped into the "B" gas stream after compression and is used as a sponge oil for this gas. It is later pumped with the compression gasoline to the liquid contactor in the sweetening unit from which it is pressured to the twentieth tray of the lean-oil still to serve as reflux. The gases released in the two flashes, if above 425-psi. are sent directly to the 425-psi. contactor; if below this pressure, to the compressor suction of the "B" stream for compression to 425-psi. for sweetening.

3. Natural gasoline plant . . . The liquids-extraction unit is the standard high-pressure absorption type, different only in that a heating-oil system is used instead of steam to supply process heat to the fractionator reboilers and feed preheaters. This is common refinery practice, but seldom used in natural-gasoline plants. The heating oil is the same oil as the absorption oil. A continual interchange of oil between the systems is provided so that but one purifier or reclaimer is required for both systems.



with the McKamie-Patton unit. This flow sheet does not show the new deethanizer which has been added. Fig. 1.

A heating-oil circuit was designed to supplement the steam capacity of the boiler plant since the latter is required to supply heat for the new Girbotol facilities.

Absorption section . . . The 1,430-psi. effluent sweet gas from the high-pressure contactor of the sweetening plant is absorbed at approximately 1,420-psi. in an oil absorber and flows through the activated alumina driers to the second stage of the gas injection compressors.

The 425-psi. sweet gas from the low-pressure Girdler contactor flows through the 425-psi. oil absorber and is subsequently compressed to 1,420 psi. and commingled with the gas from the high-pressure absorber ahead of the driers.

Stripping section . . . A single-still distillation unit is employed, but this is augmented by a rich-oil absorber which acts as a rich-oil deethanizer and decreases the load on the rich-oil-heater, as well as reducing the volume of recycle gases to the low-pressure compressors. The residue vapors from the rich-oil absorber are then piped to the low-pressure "B" gas compressors suction scrubber for further processing.

Fractionation section . . . Five fractionating columns are in use—one deethanizer, one depropanizer, two debutanizers, and one deisobutanizer. The latter three vessels were tied into the present operations from the original plant. Complete propane drying and sweetening equipment has been provided. Currently three products are being marketed: Propane, butane-gasoline, and isobutane.

Vessels used as the depropanizer and debutanizer in the old plant are now employed as the No. 1 and No. 2 debutanizers and are operated in parallel. The feed to the debutanizer is split, with the stream to No. 2 debutanizer on flow control while that to No. 1 debutanizer is on reboiler level control. The feed to No. 2 debutanizer thus remains constant while plant variations are reflected in No. 1 debutanizer. Reflux for the No. 1 debutanizer is on flow control. Base temperature operates a temperature controller on the heating oil to the reboiler. Pressure control is obtained by bypassing hot vapors around the condenser. The same control is used for the No. 2 debutanizer except that pressure control is through regulation of water to the condenser.

4. Gas dehydration and injection . . . The dehydrators operating at 1,410 psi. are the solid-bed desiccant type using activated alumina as the adsorbing medium. The beds are regenerated with hot gas. The high-pressure compressor plant consists of six 800-hp. angle-type gas-engine-driven compressors with four compressor cylinders to the machine.

PROCESS AREA OF Stanolind Oil & Gas Co.'s Stano plant near Ulysses, Kans., which has undergone recent expansion. Total gas load is split between the original plant and the adjacent new addition.

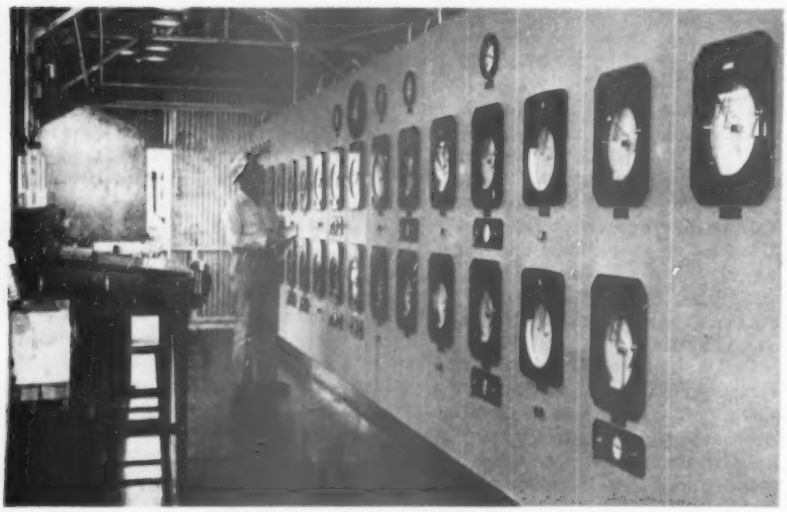
Ulysses Plant Now Stanolind's Largest

Recent expansion enlarges gas-processing capacity to 3¼ million cubic feet daily

by John C. Reidel
District Editor

THE Stano plant addition went into operation in 1952. This extension makes the plant near Ulysses, Kans., the largest in gas-processing capacity of the 14 gasoline and cycling plants operated by Stanolind Oil & Gas Co.

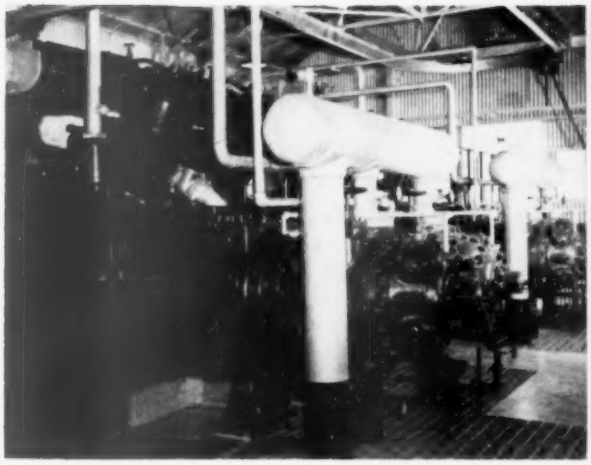
Total gas load is split between the original plant and the adjacent new plant addition. The deethanizer of the new plant handles the still-top product and recompression condensate from both plants. The quantity of deethanizer bottoms product returned to the old plant for further processing is in proportion to the amount of gas handled by that plant.



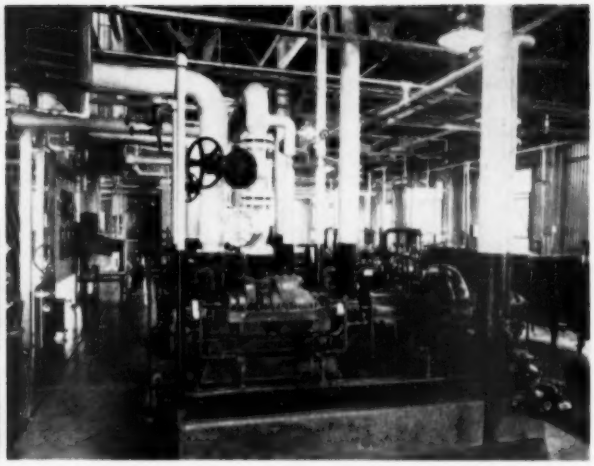
INSTRUMENT CONTROL PANEL in central control building at Stano gasoline plant.

Original Stano plant . . . This went on stream early in 1949 with a capacity of over 100,000,000 s.c.f.d. *(The Oil and Gas Journal, September 1, 1949, page 40).* As greater gas reserves from Hugoton field were made available for liquids extraction, Stanolind went ahead with the plant extension. The plant addition has increased the total design gas-processing capacity of the Stano plant to 325,000,000 cu. ft. per day in winter operation and 225,000,000 cu. ft. daily in summer operation based on a total absorption-oil circulation, in either season of 2,000 g.p.m.

Plant facilities originally installed include two absorbers, each with a design capacity of 75,000,000 cu. ft. per day of raw gas, a rich-oil heater which also makes superheated steam for stripping.



GAS-ENGINE-DRIVEN RECOMPRESSORS located in recompressor building.



NEW BOILER FEED PUMPS in boiler pump house.

a 20-plate still, and recompression equipment. The fractionation section of the old plant includes a depropanizer and debutanizer. Process facilities of the new plant are identical to those of the old plant, except that the new plant incorporates a deisobutanizer as well as a deethanizer. A hot vent vapor exchanger has been added in the new plant. This exchanges heat between the hot flash vapor from the hot rich-oil vent tank and a portion of the cold rich-oil stream flowing to this tank.

Plant Addition

Design process capacity of the Stano plant addition is 200,000,000 cu. ft. of wet gas on daily standard (14.65 psia. and 60° F.) basis winter and 138,500,000 cu. ft. summer operation, with lean-oil circulation rate in both cases of 1,250 g.p.m. The plant addition was designed and constructed by Stearns-Roger Manufacturing Co.

Gas composition . . . Design is for average gas composition as follows:

Component	Mol per cent
N_2	15.73
CO_2	0.18
C_1	71.83
C_2	6.40
C_3	3.73
i-C_4	0.36
n-C_4	1.10
i-C_5	0.18
n-C_5	0.26
C_6	0.14
C_7-plus	0.09
Total	100.00

Products . . . A residue sales gas is produced having a minimum gross heating value of 925 B.t.u. per cu. ft. On the basis of the inlet gas composition given the plant addition is also designed to produce:

	Gal. per day — Summer	Winter
Propane	33,120	49,536
Debut. gasoline	36,720	52,992
26-psi. R.v.p. gasoline	53,280	73,728
Mixed butanes (and debut. gasoline)	56,736	79,344
Mixed butanes (and 26-psi. gasoline)	40,176	58,608

Process Flow and Instrumentation

The Stano plant addition process cycle is shown in the accompanying flow diagram. Wet gas enters the plant at 350 psig. (design) pressure. Inlet gas flow is split between the two absorbers.

Absorption . . . The absorbers are 114-in.-i.d. vessels, each equipped with 25 bubble trays. Absorber liquid level is controlled by a level controller operating a control valve on the discharge of the rich-oil pumps. Residue gas leaving the residue-gas scrubbers (bottom section of each absorber) goes through flow recorders. This flow record aids in balancing flow of gas through the two absorbers and in adjusting the absorber gas-oil ratio. Absorption-system operating pressure is maintained by a pressure recorder controller operating two control valves in the residue-gas line.

Rich-oil heating . . . The main stream of rich oil is heat-exchanged with hot lean oil from the base of the still. A small portion of the rich oil goes through the hot vent vapor exchangers. These two rich-oil streams are then recombined and enter the hot rich-oil vent tank at a temperature of between 408° and 415° F. Flow rate of oil going to the heater is controlled by a flow recording controller that is reset by the hot rich-oil vent-tank liquid-level controller. The flow controller has a low flow stop connected through an electrical system so that fuel gas to the heater can be shut off if the rich-oil flow rate gets too low. As the heater fuel is shut off, an alarm will sound. Fuel gas will also shut off if normal stack temperature is exceeded or if fuel-gas pressure gets too low.

The rich-oil stream is split to enter the upflow heater at two points. The heater has four convection and two radiant passes. The rich oil leaves the heater at approximately 500° F.

Still operation . . . Hot rich oil enters on a chimney tray between the twelfth and thirteenth bubble trays of the 22-tray still. A liquid-level controller at the base of the still controls flow of stripped absorption oil to the rich-oil exchangers. A dewatering leg made of 20-in.-diameter pipe is provided with an interface liquid-level controller.

The still-reflux condenser is an aerial unit consisting of six cooling sections cooled by three four-blade adjustable-pitch fans operating at about 282 r.p.m. There is no level control on the hot still reflux accumulator so that any excess reflux will flow with uncondensed material to the still-top product condenser. Reflux rate control is by a temperature recorder controller actuated by the top tray temperature.

The still-top product accumulator is provided with a liquid-level controller which controls the amount of liquid being pumped to the deethanizer feed surge tank by throttling of the still-top product transfer pump discharge. The boot legs of both the reflux and still-top product accumulators are provided with interface level controllers.

A pressure recording controller, actuated by the pressure in the still over-

head line upstream of the reflux condenser, operates a control valve in the vapor line from the still-top product accumulator to maintain pressure on the still. Vapor can vent through a back-pressure controller to flare.

Oil purification . . . A vessel 84-in. i.d. by 16 ft. high, containing two tube bundles in the lower section and a mist extractor at the top, is employed as an oil-purifying still. Oil comes from the feed tray of the main still. In operation the oil level is held at a few inches above the tube bundles and the total quantity of stripping steam is diverted through the oil-purifying still before it passes into the main still.

Vapor recompression . . . Two Type G.M.V., four-cylinder gas-engine-driven recompressors in the Stano plant addition handle the uncondensed vapors from both the still overhead accumulator of the old plant and the still-top product accumulator of the new plant. The steam and gas-driven recompressors of the original plant are used as standby.

Clearance pockets . . . Considerable flexibility in recompressor capacity is obtained through the use of clearance pockets. For example, one of the engines has a capacity of 4,380,000 s.c.f.d. at 300 r.p.m. with all clearance pockets closed. The minimum capacity of this engine is 2,250,000 s.c.f.d. at 200 r.p.m. with all clearance pockets open (capacities figured at 790 psig. suction and 382 psig. discharge pressure).

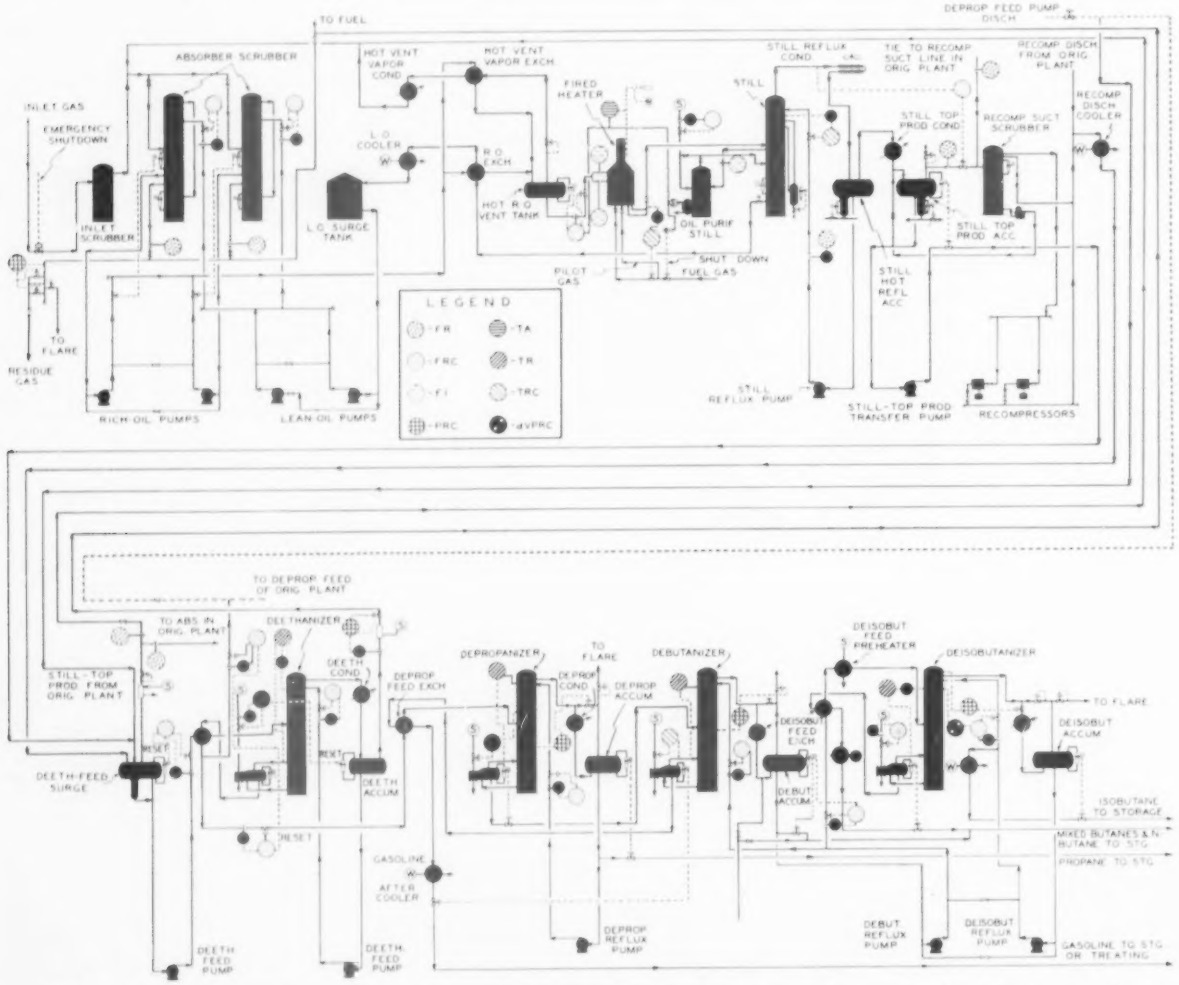
Both recompressors in the Stano plant addition are designed to handle a total of 7,500,000 s.c.f.d. in summer and close to 6,000,000 s.c.f.d. in winter. Both of the engines are provided with automatic speed controls and automatic unloading facilities. If vapor load falls, for example, engine speed will be automatically reduced. Further fall in vapor load after speed has been decreased will result in automatic adjustment of clearance pockets. As these are adjusted, the engine speed will automatically increase to maintain proper suction pressure. Such adjustment can continue down to the minimum speed and capacity.

Lift trap . . . Normally a small amount of liquid will separate out in the recompressor suction scrubber. During severe winter weather a greater than normal accumulation of liquid in the scrubber may be anticipated. This may also occur during startup, since the line from the still-top product accumulator to the recompressor suction scrubber is a long one.

A lift trap is employed to lift the liquid from the scrubber back into the still-top product accumulator. This trap operates somewhat like a bucket-type steam trap. However, steam is the ac-

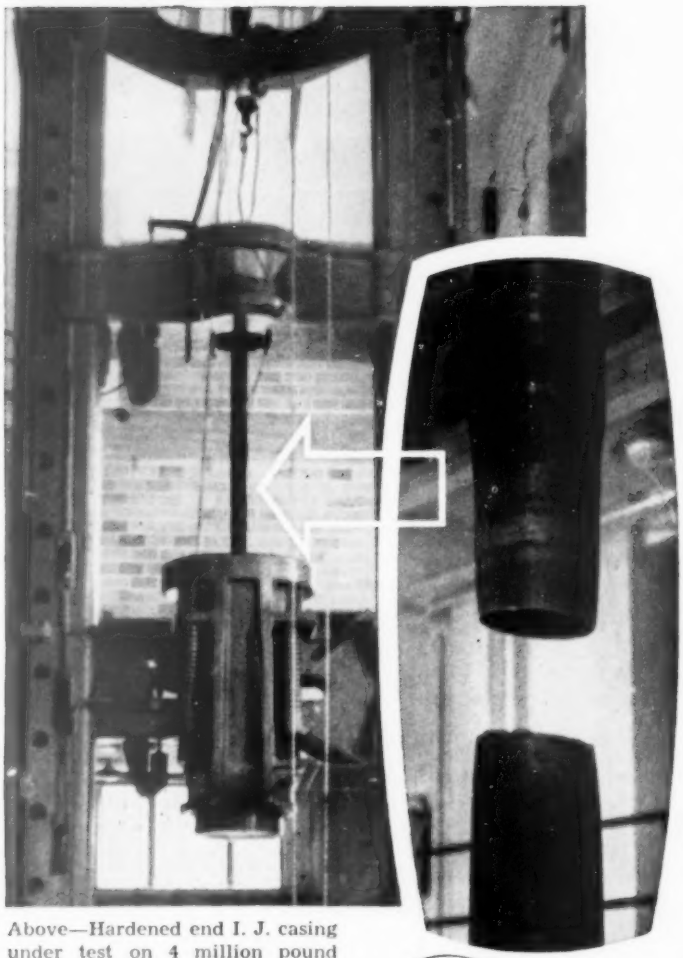
(Continued on page 244)

I. P. E. ISSUE NO. 2
• *PROCESSING*



PROCESS CYCLE of the Stano plant addition. Wet gas enters plant at 350 psig. (design) pressure. Inlet gas flow is split between two absorbers.

EXTRAS *that make it* BETTER



Above—Hardened end I. J. casing under test on 4 million pound testing machine at University of California. Closeup at right—Note that tested pipe broke in body, away from threaded connection.

Hardened Ends and API Threads on Youngstown Deep Well Casing

YOUNGSTOWN casing - Integral Joint and Threaded and Coupled - is produced with heat treated ends to meet the higher requirements of deep well drilling. The advantages are:

1. Controlled heat treating of ends assures homogenity of structure throughout the pipe wall.
2. Hardening makes upsets unnecessary, thus eliminates obstructions on the internal surface of the casing.
3. High joint strengths - meeting requirements of API Bulletin 5A-1 - are proven by repeated tests.
4. Integral joints improve long strings by eliminating half the threaded joints. Simplification also results as the same thread can be used for an entire string, heat treated on top, untreated on bottom. No crossover joints required.

For data on actual performance in the field, write or phone the nearest Youngstown District Sales Office.

QUALITY YOUNGSTOWN SERVICE

Youngstown

OIL COUNTRY TUBULAR GOODS

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices: Youngstown, Ohio - Export Office: 500 Fifth Avenue, New York 36, N. Y.

PIPE AND TUBULAR PRODUCTS - CONDUIT - BARS - RODS - COLD FINISHED CARBON AND ALLOY BARS - SHEETS - PLATES - WIRE - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - RAILROAD TRACK SPIKES

Cradling 24-in. pipe into the ditch behind coating and wrapping machine and holiday detector testing enamel wrapped with glass mat and kraft paper.

Section of 22-in. pipe with concrete river weights being welded prior to tie-in welding at Mississippi Valley.

Sinclair's Big-Inch Contender for Year's "River-Crossingest" Line

Five major rivers were crossed, all by a single line, in laying this newest large-diameter crude-oil artery. The system features the latest advances in equipment at its pump stations and in communication.

by Paul Reed
Pipe-Line Editor

Executives of Sinclair Pipe Line Co. at communications board at Independence, Kan., headquarters. Left to right, Robert C. Bearden, executive, vice president; William H. Morris, president; Roy J. Tibbets, chairman of the board; and A. A. Davidson, part interest executive.

SINCLAIR PIPE LINE CO.'s 670-mile, 24-in. and 22-in. crude-oil pipe line costing $52,000,000, completed this year, extends from the important junction point at Cushing, Okla., to East Chicago. With the initial seven pump stations the line has an initial capacity of 280,000 bbl. daily on the 24-in. segment and 150,000 bbl. on the 22-in. segment.

The project includes 330 miles of 24-in. between Cushing and the connection with the Platte Pipe Line at Salisbury, Mo., and 340 miles of 22-in. from Salisbury to East Chicago.

Pump Stations

The seven initial stations have a total of 37,650 hp. in electric-motor-driven centrifugal units.

The four stations south of Salisbury including Cushing, Cobb (near Caney, Kans.), Humboldt, Kans., and Gunn (near Harrisonville, Mo.), each has three two-stage pumps driven by 1,750-hp. motors and a single-stage pump driven by a 900-hp. motor.

The three stations at the northern end include Kay (near Salisbury, Mo.), Quincy, Ill., and Flanagan (near Pontiac, Ill.). Each of these stations has three two-stage pumps driven by 1,250-hp. motors and a single-stage pump driven by a 600-hp. motor.

Motors . . . The motors are of enclosed forced-ventilated, squirrel-cage type. They are equipped with standard ring

Bethlehem Pipe being lowered into trench. Installation proceeds without disrupting Industrial Boulevard traffic.

Girth seam is welded in the field.

Pouring hot tar enamel over weld.

NEW STEEL GAS LINE IN DALLAS

To improve its distribution facilities, the Lone Star Gas Company, Dallas, Tex., recently installed a 12,000-ft welded-steel pipeline along Industrial Boulevard in Dallas. The pipe selected was 24 in. x 5/16 in. Bethlehem Gas Pipe. It meets the requirements of Specification API-5Lx42, and was tested to 930 psi pressure. The contractor was Ben Sira & Co., Dallas.

This Bethlehem pipe is ideal for either gas or oil distribution lines because it is sound and dependable. It is carefully made from steel plate. It is leak-proof, and beam-strong. Its surfaces are protected against corrosion by a uniform coating of coal-tar enamel. It can be installed economically. Besides meeting Specification API-5Lx42, it is also regularly made to ASTM Specifications A134 or A242-50T (Mayari R).

Bethlehem Oil and Gas Pipe generally comes in 40-ft lengths, with either beveled or plain ends. It is made in all diameters from 22 in. i. d. up to the largest permitted by common carriers.

For complete information about Bethlehem Oil and Gas Pipe, please get in touch with the nearest Bethlehem sales office.

SEVERE VIBRATION?
HERE'S WHAT TO DO—

To resist the effects of severe vibration, use pipe made of Mayari R, Bethlehem's low-alloy, high-strength steel. Mayari R withstands vibration because of its excellent resistance to repeated stresses. It has a yield point of 50,000 psi min, and an endurance limit of 50,000 psi.

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BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

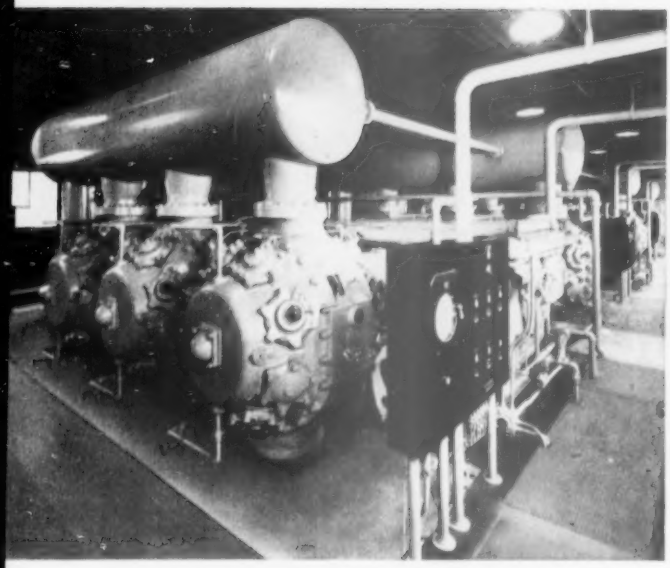
BETHLEHEM STEEL

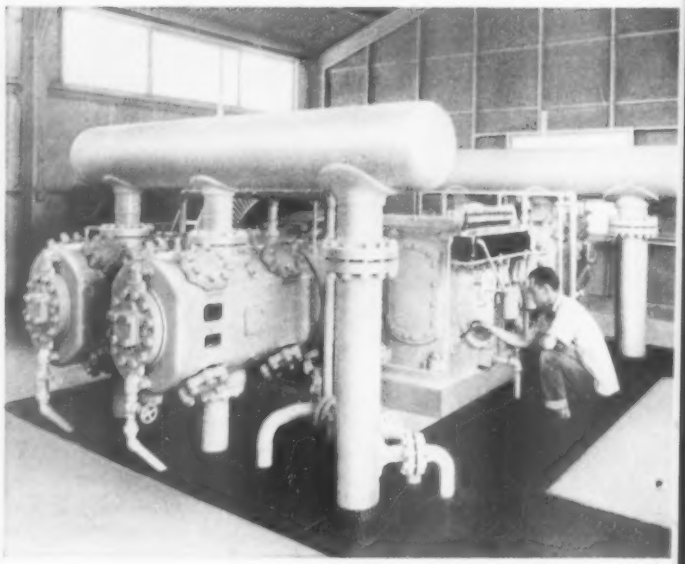
BETHLEHEM OIL AND GAS PIPE

SPACE-SAVING, FUEL-SAVING

Cooper-Bessemers

ON THE P. G. & E. SYSTEM





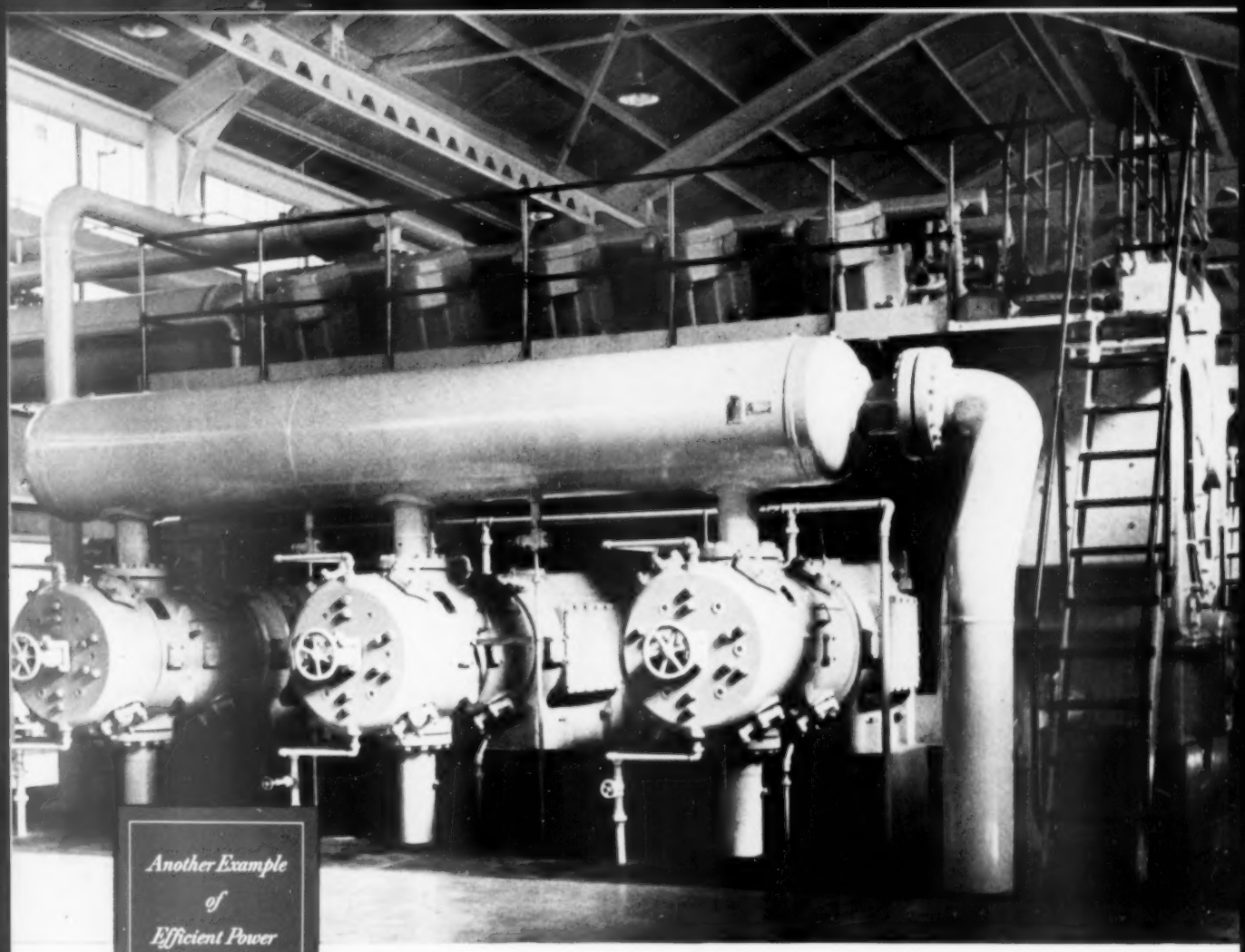
Above, left: Three Cooper-Bessemer 3,000-hp JM-6 motor-driven compressors in P. G. & E. Point Richmond distribution holder station. Above, right: Cooper-Bessemer 1000-hp FM-4 motor-driven compressor in North Sacramento station, for distribution and underground bottle storage service. Cooper-Bessemer units like these, totaling 17,350 horsepower, are used in six P. G. & E. stations for like service.

ANGLE

Compressors

New York Washington, D. C. Bradford, Pa.

San Francisco, Cal. Houston, Dallas, Greggton, Pampa and Odessa, Texas Seattle, Wash.



Another Example of Efficient Power at Lower Cost

Line-up of seven Cooper-Bessemer 2500-hp GMW V-angle units in P. G. & E. Hinkley compressor station on the Super Inch Line. The Topock station on the California-Arizona border is Cooper-Bessemer powered with six GMW-10's. These stations, together with a new Kettleman Hills station, have increased line capacity from 250 to 400 millions of cu. ft. per day.

As shown on these pages, modern Cooper-Bessemer compressors, both engine-driven V-angles and motor-driven units, are used in the Pacific Gas & Electric Company system.

On the company's Super Inch Line bringing gas from Texas, big GMW-10's pack low-cost compressor horsepower into relatively small space—six GMW's at the Topock station, seven at Hinkley. And at the third key compressor station, Kettleman Hills, seven 23-year-old Cooper-Bessemer Type 19 horizontals are still on the job, powering the original station serving the first two lines laid north to the San Francisco Bay area. All told, these units total 37,750 Cooper-Bessemer compressor horsepower on P. G. & E. gas transmission lines.

In addition, modern, compact motor-driven Cooper-Bessemer FM's and JM's, as shown at left, provide 17,350 compressor horsepower for distribution and storage services . . . at the company's Hollister, North Sacramento, Modesto, Fresno, Point Richmond and Potrero stations.

You too can rely on Cooper-Bessemers. They provide the most advanced, most economical compressor service to be had today. Check with the nearest Cooper-Bessemer office for the latest information on meeting your compressor needs.

by **Cooper-Bessemer**

MOUNT VERNON, OHIO AND GROVE CITY, PENNA.

Tulsa Shreveport St. Louis Los Angeles Chicago

Rock drilling rig at approach to Elk River in Kansas in preparation for blasting.

Table Mound microwave installation near Independence, Kans., with double repeater facilities.

Microwave tower for Table Mound repeater station in concrete house.

oil sleeve bearings which have been found satisfactory for large, 1,800-r.p.m. motors. The 2,300-volt motors were selected because of their safety and economy.

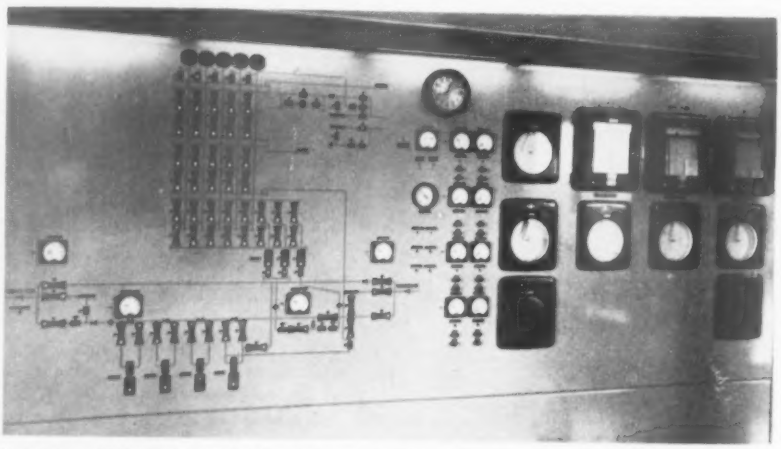
A cross-the-line or full-voltage motor starting has been adopted. This found ready acceptance on the part of the power companies serving the big-inch line.

Drivers for tank mixers, for blowers, and for tank booster pumps moving oil from tanks to main pumps, are 440-volt, 3-phase motors. These tank booster units are controlled from the central control panel in the pump building.

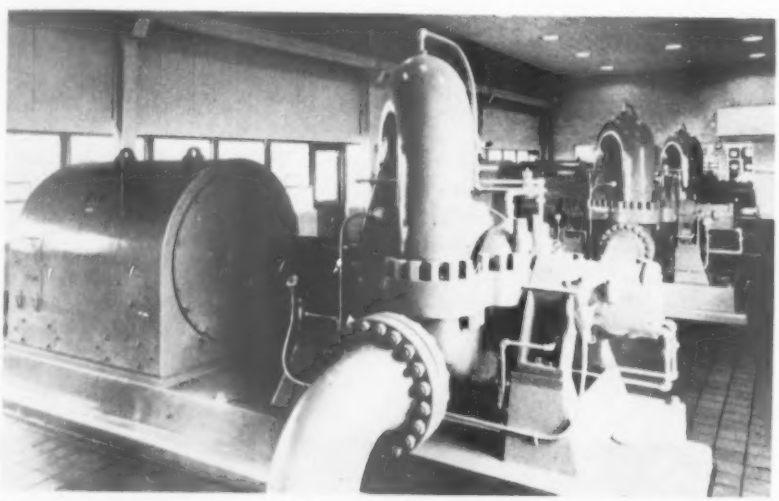
Stations are heated by blower-type electric heaters with a total capacity of 240 kw., which are thermostatically controlled.

Feeder busses . . . The load center is of type A construction including main service feeder busses and individual units which are removable through the so-called "magna-grip" buss connector. This latter automatically connects to the feeder buss when the unit starter is inserted. For safety and standardization all contactor and breaker combinations are provided with a transformer for reduction of the control voltage to 220 volts. They are wired so that moving the breaker arm to the "off" position will kill the control circuit as well as the power circuit.

Control board . . . The central graphic control board is the focal point for all recording, indicating, and control in-



Central control board at Cushing station with piping diagram and recording, indicating, and control instruments.



Pump room at Cushing station which has three 1,750-hp. units and 900-hp. unit of electric centrifugal type.

Another development using

B. F. Goodrich Chemical *raw materials*

Hycar rubber seal made for the Guiberson Seal-O-Matic Union by The Guiberson Corporation, Dallas, Texas. B. F. Goodrich Chemical Co. supplies the Hycar rubber only.

DOUBLE SEAL FOR DOUBLE SAFETY—*with Hycar!*

WHEN a manufacturer wants *extra* assurance of a pressure-tight seal, he frequently finds Hycar American rubber is a natural for the job. Like the pipe union pictured here, for example.

Machined seats on the two hubs of the union provide a metal-to-metal seal when the nut member is tightened. But depending upon a metal-to-metal seal alone is sometimes not enough. Corrosion, foreign material on the sealing surfaces, damaged seats and line vibration could result in a pressure leak.

To guard against such damaging factors, a Hycar rubber sealing ring is used between the two hubs of this pipe union. It provides an *additional* seal, helps protect against failure that could result from an imperfect metal-to-metal seal.

And Hycar does even more. It effectively resists the abrasion encountered in mud line service, oil, gas, many chemicals, high pressures and high temperatures.

Hycar does many successful jobs in the petroleum and in other industries. Perhaps it can help you solve a problem, improve or develop more saleable products. We'll help you select the right Hycar rubber compound for your needs. For information, please write Dept. HJ-6, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ont.

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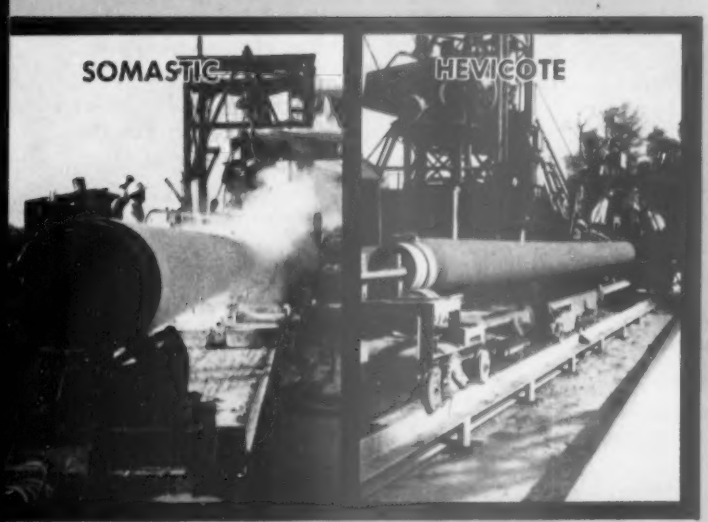
American Rubber

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON colors

...seamless coating for corrosion prevention

...heavy-density reinforced concrete coating



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- ASSURES PERMANENT PROTECTION AGAINST EXTERIOR CORROSION . . .
- CONSERVES STEEL BECAUSE WALL THICKNESS OF PIPE NEEDS ONLY BE SUFFICIENT TO WITHSTAND OPERATING PRESSURES . . .
- ADDS IMPORTANT WEIGHT TO LINES WHERE NEGATIVE BUOYANCY IS A PROBLEM . . .
- CAN BE HAULED AND STRUNG, ROLL WELDED, BENT COLD, LOWERED INTO TRENCH AND BACKFILLED BY ORDINARY METHODS WITHOUT DAMAGE TO THE COATING . . .
- TWO ECONOMICAL METHODS OF APPLICATION

SOMASTIC

Somastic is a thick, impervious asphalt-mastic coating, tightly bonded to the pipe and made continuous by overlapping field joints molded of the same material. It provides protection for pipelines laid under water, in swamps and in congested areas where severe electrolytic action is encountered. With over 23 years of field testing, Somastic has proved its value in combating all forms of corrosion. Somastic IS the best pipe coating.

- ASSURES SUFFICIENT WEIGHT FOR PERMANENT ANCHORAGE AT MARINE CROSSINGS . . .
- ELIMINATES NEED FOR EXTRA-THICK WALL PIPE OR EXPENSIVE RIVER WEIGHTS . . .
- AVOIDS COSTLY REPAIR OR REPLACEMENT . . .
- PERMITS EASY HANDLING BECAUSE OF SMOOTHNESS AND FLEXIBILITY . . .
- DISTRIBUTES STRUCTURAL STRESS EVENLY . . .

HEVICOTE

HEVICOTE is the solution to your negative buoyancy problem in laying pipelines under rivers or beneath swamps. The thickness of HEVICOTE can be regulated to provide any weight required for negative buoyancy. Developed by HCPCO, this seamless concrete coating — reinforced with a special overlapping wire mesh — has stood up under the most exacting field conditions.

MEET HERMAN HEVICOTE

This happy, heavy little character tells you all about HEVICOTE in a new 16mm sound motion picture. . . . Requests for showings should be made to H. C. Price Co., Bartlesville, Okla.

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PIPELINE
PRICE
CONSTRUCTORS

Main-line station building at the Cushing terminal.

struments. It is placed in front of a large glass partition through which the operator can see all pump-room equipment.

Motor-operated valves are controlled from two points: (1) At the valve with a "three-button station" (open-stop-close) and (2) at the central control panel with indicating lights and similar three-button station.

Resistance elements which are imbedded directly in the windings of motors on main pumping units and connected to a multipoint recording instrument will shut down the unit in a maximum of 48 seconds after the temperature in any phase reaches a preset maximum. By horn and signal light the operator is told when temperature rises to 10° lower than the trip temperature. This gives him time to correct the trouble before automatic shutdown occurs.

Thermocouple detector elements are located immediately adjacent to the bearing metal in each bearing of the main motors and pumps. An alarm warns of malfunctioning and a signal light on the control panel indicates the source of trouble. The particular bearing may be identified by observing the strip chart on the recording instrument.

In the high-pressure wells in pump cases there are thermocouple detector elements connected to a multipoint recording instrument. An alarm is given at 40° C. and a shutdown at 50° C. within a maximum of 16 seconds after the overtemperature is reached. This protects against the discharge valve being held closed too long as well as against danger from pump malfunctioning. When the alarm sounds, an indication of trouble is given by a light on the control panel, as well as on the recording chart.

Switch gear . . . Relays in the switch gear will trip out the entire station with the exception of lighting power, in the event of an abnormal single-phase condition, undervoltage, overvoltage, or phase reversal on the incoming power line. Relays are provided with a time delay to prevent unnecessary shutdowns on momentary voltage fluctuations. All main breakers will automatically trip when the key interlocked high-voltage disconnects are operated.

Strain gage . . . Primary pressure detectors of the strain-gage pressure-cell type give pressure indication and they also give "over and under" pressure unit trip and alarm. These strain-gage pressure detectors are connected through amplifiers and relays.

Individual cells on each unit suction give low-pressure protection with a light on the central control panel to indicate which unit has tripped. One cell on the station side of the control valve, with four relays, successively trips off the four units, one at a time, as the pressure exceeds preset limits. Lights on the central control panel indicate the units that have tripped. One cell on the line side of control valve trips out all units at once on high pressure. This is indicated by a light on control panel.

Shut down . . . A button on the central control panel will shut down the entire station, including lights, etc., in case of emergency. In addition, another "break seal" type emergency station is located outside the building near the gate entrance.

All of the protective and signal devices are wired into a common alarm circuit which is arranged so that any fault will sound an alarm horn in the control room and pump room and give a signal by a light on the control panel. Three push buttons are used for the alarm system. One of these silences and resets the horn; another extinguishes the "trouble light" only after the fault has been rectified. The third button, known as the light-test button, allows the operator to check all single-action indicating lights for burnouts.

Line Construction

The terrain traversed by the Sinclair big-inch is notable for the large number of wide rivers crossed.

Pipe laying started in December 1951 and was completed in March 1953. The route was laid out by a line over the shortest distance, making only such deviations as were needed. An aerial survey preceded purchase of right-of-way and ground surveying.

Pipe was of three types: (1) X52 grade electric welded pipe of 11/32-in. and 9/32-in. wall thickness; (2) X-46 grade seamless of ⅜-in. and 5/16-in. wall; and (3) X-42 grade electric welded, ½-in. wall.

Contractors . . . Laying of pipe was contracted by O. R. Burden Construction Co. for 325 miles; R. H. Fulton & Co. for 180 miles; and by Britton Contracting Co. for 165 miles.

Pipe was protected by standard procedures for applying coal-tar enamel and glass mat with final wrap of kraft paper. An electronic holiday detector ran immediately behind the coating and wrapping machines. Lowering in was done by cradling in ditch behind dope operations insofar as possible. In warm weather the hot coating was cooled by water spray, but when the weather was extremely hot the coated pipe was laid on skids beside the ditch for lowering in when dope had "set."

All welds at road and river crossings and 10 per cent of the main-line welds were X-rayed.

Test points were installed in preparation for cathodic protection which will be applied this year, mostly with the use of rectifiers.

In 15 miles of swampy ground near East Chicago, pipe was all of ⅜-in. wall thickness, double coated and wrapped and ballasted by "half river weights" of concrete.

Block valves are installed at all major river crossings and at 8 to 25-mile intervals on the main line.

River Crossings

The Sinclair big-inch crossed more large rivers than any other of the major crude-oil systems completed this year. These are the Cimarron, Arkansas, Missouri, Mississippi, and Illinois rivers. Each of these rivers was crossed by a single line.

At major rivers, the general procedure was to use ½-in. wall pipe, double coated and wrapped with coal-tar enamel and glass mat, and final wrap of kraft paper. Where pipe was pulled into the stream, wooden slats were applied to protect the coating. Ballasting was accomplished by concrete river weights. Rock shield was placed under each river weight.

River weights . . . At the Cimarron and Arkansas 24-in. river crossings, 5,300-lb. river weights were clamped on the pipe at 20-ft. intervals. At the

OIL

leads the way!

The Oil Industry, traditionally a pace setter in World Affairs, leads in the purchase of AERO COMMANDERS too. One-third of all Commanders released to the business world are now serving the Petroleum Industry.

A E R O DESIGN *Commander*

AERO DESIGN AND ENGINEERING COMPANY
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- **Blend 110,000 bbls.** of gasoline, in two hours or less, with three 25-HP LIGHTNIN Mixers—only 75 HP total input.
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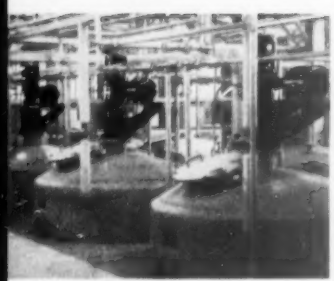
Blend rapidly, to full uniformity
in tanks as large as 150,000 bbls.



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FOR CAUSTIC TREATING, feed water treating, preparing specialties, and dozens of other jobs, you can standardize on LIGHTNIN Portable Mixers. Thirty models. Sizes ⅛ to 3 HP.

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These units give you up to ten times the volumetric flow possible with other blending methods. That means you save money by reducing HP input, as well as turnover time. And you multiply the productive capacity of your tankage.

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Results are guaranteed on a money-back basis when you use LIGHTNIN Mixers. You get 100% protection—full insurance that the mixer will do the job it is supposed to do. Field experience on thousands of installations, plus 25 years of research in fluid mixing, make this guarantee possible.

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MIXCO fluid mixing specialists

Missouri River 24-in. crossing 2,187-lb. weights were clamped at 6-ft. 8-in. intervals.

At three of the major rivers, pipe was laid with a slight upstream bow. At the Cimarron and Arkansas rivers this bow was 90 ft. upstream at its farthest point. At the Mississippi and Illinois rivers, pipe was laid straight across.

The crossing of the Cimarron River was constructed entirely by the method of dewatering the river bed in order to lay the line at a depth of 10 to 12 ft. below the lowest point in the river bed so that it would be below severe scouring action in flood time.

Trenching . . . Both dewatering and dredging were done at the Arkansas River crossing 4½ miles west of Cleveland, Okla. Dewatering operations were conducted from the north bank for a third of the distance across the river. At the south bank a sandstone ledge was encountered at depths of 10 to 12 ft. where the current flowed at such a swift rate between the rock and the river sand that dewatering was discontinued and the crossing was completed by trenching and dredging in the usual way. Width of the river itself was approximately 1,100 ft. Altogether, river pipe of 24-in. diameter and ½-in. wall thickness was laid for a stretch of approximately 2,600 ft. At its deepest point the Arkansas River pipe was 6 ft. below the bed of the river.

At the gently sloping north bank the sag bend is 125 ft. inland from the river; at the steep rocky south bank the sag is 50 ft. from the river.

The Missouri River crossing traversed 400 ft. of limestone. Pipe was pulled in two sections and laid 7 ft. below the river bed at the lowest point.

The Mississippi River crossing north of Quincy, Ill., involved the laying of 7,200 ft. of 22-in. pipe, of which 3,500 ft. was in the river proper. The river was approached through levees on both sides.

Levees . . . To meet requirements of the U. S. Engineers and Drainage District authorities, the levees at the Mississippi River were cut clear down so that the pipe went through casing laid at the bottom.

Backfill was tamped when replaced at the levees. On the east side of the river, backfilling was done with clay because of the sandy nature of the soil.

River engineers believed that there would be more danger of seepage along the pipe at this point on the river if pipe were laid near the top of the levee than there would be if it were laid near the bottom.

Plates welded to pipe insure a positive seal on the annular space between pipe and casing.

Baffle plates on the casing stop seepage and present small animals from boring along the pipe.

River weights of 2,410 lb. each were placed at 6 ft. 8-in. centers across the Mississippi River. In the swampy areas adjacent to the Mississippi, 5,690 lb. weights were placed at 25-ft. centers.

Pipe Double Jointed

On the bank, pipe was double jointed to form 80-ft. lengths which was coated, wrapped, and equipped with weights before they were barged to a conventional ramp barge for final welding to the line. Dredges followed the ramp barge to lower pipe to the required elevation.

Pipe was laid at depth of 5 ft. below lowest point of the Mississippi River bed which is 23 ft. below standard low-water level.

Levees near the Illinois River in Illinois were crossed near the top and were cut at an elevation where there is only 8 ft. of cover. The reason that the Illinois River levees were crossed near the top was that, in this locality, the river engineers believed that during periods of high water there would be no danger of seepage along the pipe.

The Illinois River crossing was 3,900 ft., including 1,800 ft. in the river itself.

There is negligible scouring action in the parts of the Mississippi and Illinois rivers crossed by the Sinclair big-inch.

Rock shield . . . In addition to using rock shield under river weights, this stiff pliable board material was also wrapped around the pipe in rocky ground to protect against damage from backfill. Furthermore, in rocky ground small pieces of rock shield 20 by 36-in. were laid on dirt pads to protect the coating at the bottom of the pipe because the usual type of fine earth padding was more costly to procure than this kind of protection.

At gravel road crossings where casing was not used the pipe was wrapped with rock shield.

Road crossings . . . At paved road crossings a flood coat of enamel was applied after the standard coating (less kraft paper). This was followed by a coat of whitewash before fastening casing insulators.

Microwave System

The microwave system for Sinclair with 863 circuit miles and 9,000 voice miles is the first one ever installed on a pipe line for as many as 24 channels at the outset; 18 of these channels are now used. Advantages for microwave communication are considerable as there are no wires beyond the station sites. There are 40 terminal and repeater stations and 12 V.H.F. stations.

Full standby service for both microwave and power requirements is provided by emergency engines of suitable capacity to guarantee continuous power supply. Standby engines run on propane instead of gasoline because of better firing in cold weather. Furthermore, with propane there is no fouling from condensate. No fuel pumps are needed. These engines are equipped with shrouds for ventilation.

Several Types of Communication

Several types of communication are handled over the microwave system:

1. Remote telemetering.
2. V.H.F. communication to mobile units.
3. Teletype serving each district office.
4. Full voice communication between stations and offices for dispatching and pipe-line business.

The microwave facilities are available for supervisory control when it may be applied in the future.

Housing . . . At each repeater station, the equipment is housed in a substantial reinforced poured concrete building of 12 by 20 ft. at the base of a single steel tower guyed four ways. Repeater stations have been located near roads and at pump stations, surrounded by custodian-type fences.

The design of repeater station is simple and avoids complicated control circuits. It provides safety for personnel and equipment by use of explosion-proof equipment. Motors are base ventilated.

Between Cushing and Salisbury the microwave system operates on 6,575-6,875 megacycles (Motorola) and between Salisbury and Chicago at 1,850-1,950 megacycles (General Electric). The V.H.F. system is of 153.170 megacycles type.

Beacon lights on towers are turned on and off by photoelectric-cell "electric eyes." Voltage regulators maintains voltage at 95 to 130 volts. Double facilities are provided to insure adequate operation during emergencies when standby equipment would function.

An alarm signal is given to the central office in case of malfunctioning and subnormal temperature. Illegal entry could be signaled by means of additional equipment.

Repeater station buildings are cooled by blower which is started by inverse thermostat at 95°.

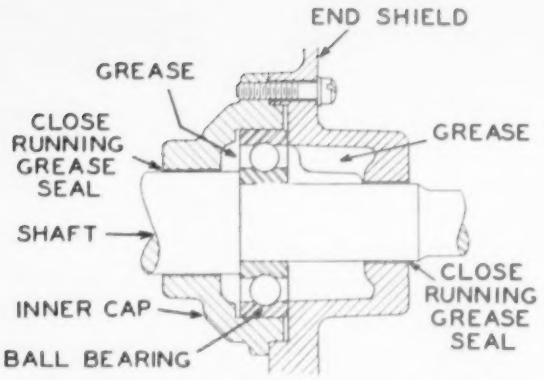

Fig. 1—Pulley-end ball-bearing housing—smaller triclad motors (Courtesy General Electric Co.)

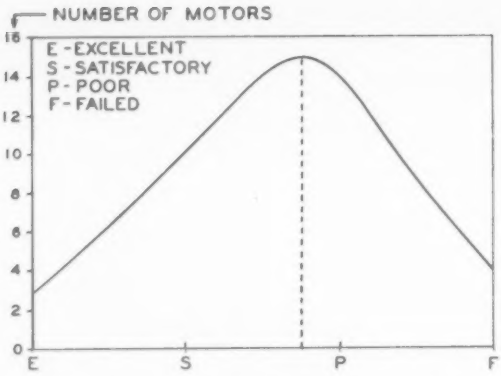

Fig. 2—Condition of motors at completion of 5-year test. Average hours operation 36,403.

New Light on Electric-Motor Maintenance

Atlantic Refining Co. has recently completed a 5-year test with 34 motors of sizes through 25 hp. The test was conducted to determine whether standard totally enclosed "off-the-shelf" motors can operate continuously for 5 years on a single greasing. Results show that 5 years is too long a period for motors in this service to run on a single lubrication, if sizable reduction in bearing failures is required. At Atlantic's Port Arthur refinery a 3-year lubrication interval has been adopted for motors of this type and size.

by F. H. Walker, Jr.
and
W. J. O'Meara

THIS article deals with one of the test programs initiated by Atlantic Refining Co. with regards to maximum utilization of existing electric-motor bearing design and lubricants. The most attractive field in which a long-term test could be applied appeared to be with the smaller two-pole motors of 25 hp. or less. Motors in this size range are more numerous in refinery operations than may be commonly thought.

At Atlantic's Point Breeze refinery this particular horsepower range represents 85 per cent of the total number of 2,454 motors presently in operation. This figure does not take into consideration the refinery expansion now in progress, which should more than double the total kilowatt demand. However, no marked deviation from this percentage figure is anticipated.

Overlubrication . . . An extension of lubrication intervals makes feasible the elimination of the familiar grease cups and fittings, thereby insuring the motors against either improper lubrication or overlubrication which, if permitted, can cause considerable harm.

Authors with Atlantic Refining Co., Philadelphia. From paper presented at A.P.I. Division of Refining, New York, May 1953.

At one time it was general practice to go all out to make it convenient for the operators and maintenance men to add more and more grease to the bearing reservoir. Whether it was by cup or gun, the result, as seen when the motor was opened, was always the same. Usually there would be more grease inside the stator enclosure than in the bearing housings. The bearings ran hotter because they slid rather than rolled; and, consequently, in spite of the abundance of lubricant, would seize and fail. For many years we have substituted plugs for grease fittings to eliminate overgreasing.

Today, with considerable progress brought about primarily through an advance of thinking rather than design, the picture is completely changed. This thinking, or revised conception of motor-bearing lubrication, is rapidly becoming standard accepted practice. Unfortunately, however, we are reaching the limit with what we have, and look to improved lubricants and design for further progress.

Motor-Lubrication Test Conditions

In cooperation with General Electric Co., from whom the motors used in this test were purchased, a program referred to as the "5-year test" (approximately 40,000 hours of operation) was inaugurated early in 1947. The purpose of this test was simply to learn whether standard grease-lubricated ball-bearing "off-the-shelf" motors of the size and speed previously mentioned would operate continuously without relubrication over 5 years. Originally 34 motors were involved. However, a concurrent testing of three other motors of similar sizes over the some period makes it possible, for purposes herein, to look at the performance of 37 motors in all.

These motors were installed on catalytic cracking units at the Philadelphia refinery (20) and the Atreco refinery at Port Arthur, Tex. (17). All motors were of manufacturers' standard explosionproof construction with Class "A" insulated windings, cast-iron frames, and grease-lubricated standard ABEC-1 (the Annular Bearing Engineers Committee) bearings. To insure the accuracy of the data obtained, the usual drilled and tapped hole into the bearing housing for field lubrication was omitted. In this way the possibility of someone's removing the plug and regreasing was eliminated. The bearings, which were of various makes, were greased at the factory with the manufacturer's standard ball-bearing

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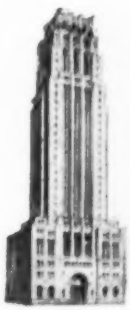

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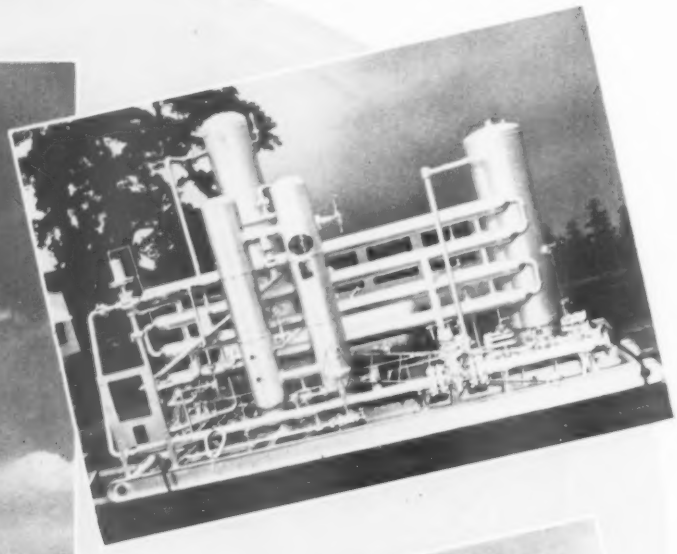

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grease, oxidation-inhibited for long life. Each bearing housing was filled about three-quarters full of grease; i.e., visualizing a completely assembled motor, the space of the bearing housing which is not occupied by the shaft and bearing was approximately three-quarters full of grease (Fig. 1).

Motor and grease data . . . As indicated, every effort was made to avoid special construction of any type in order that a truly representative test could be made. Motor and grease data are as follows:

MOTORS

Number	Horsepower	Speed
9	7.5	3,600
2	10	3,600
12	15	3,600
13	20	3,600
1	25	3,600

GREASE

Oil content, per cent by weight	80
Acid number	*Nil
Maximum free alkali (sodium hydroxide), per cent	0.3
Drop point (minimum), °F.	290
S.U. viscosity at 100° F., sec.	220 to 400
Worked consistency (A.S.T.M. D-217), mm.	27 to 29

*Acid number is milligrams of potassium hydroxide (KOH) required to neutralize 1 g. of grease. An acid number above 5 is considered harmfully corrosive to the bearing.

How Test Was Conducted

The conditions of the test and periodic inspections were relatively simple so that as much useful information as possible could be obtained with inspections and bearing removals held to a minimum. These conditions were:

1. Motors operated continuously, except for process-unit turnarounds, over a 5-year period.

2. Inspections were made on one motor at each refinery during each turnaround (approximately 1-year intervals). These inspections were made at the manufacturer's local service shop in the presence of Atlantic's engineers and factory representatives.

3. Motors received absolutely no maintenance other than yearly cleaning of the frame, unless signs of pending failure appeared, i.e., noisy bearings. However, dirt which accumulated on the frame, in the fan enclosure, and in the ventilating slots between annual cleaning periods caused the motors to operate in varying degrees of cleanliness and, consequently, with different quality of ventilation. This provided means of determining the relative effect of resulting increase of operating temperature on lubricant and bearing life. Incidentally, it should be pointed out that, through a misunderstanding on this point, the motors at

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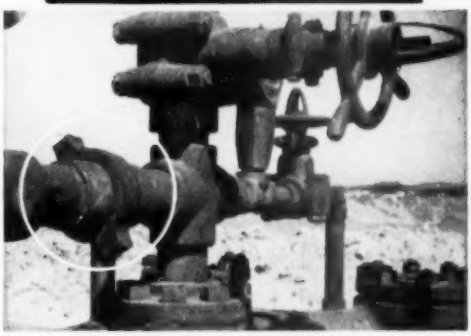

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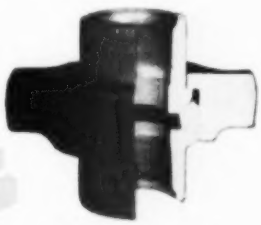
The Fig. 602 is another good example of why "It's Wise to Standardize with WECO." Start your standardization now, by specifying WECO Unions.

FIG. 602
6000 p.s.i. Test
Sizes: 1", 1½", 2", 3", 4"



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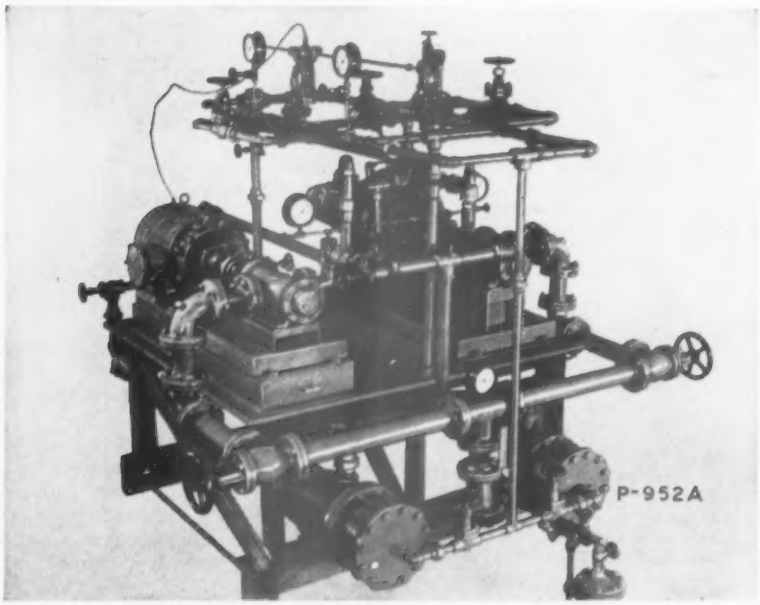

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the Port Arthur refinery were not cleaned at all for the first 3 years of the test period. The end shield under the fan and some of the ventilating ducts on these motors were coated with ⅛ to ¼ in. of adhesive oily dirt, thereby reducing heat transfer from the frame. In connection with this, it is significant to note that all four bearing failures or imminent failures from lubricant deterioration which occurred during the entire 5-year period were on fan end bearings, and three of these were on Port Arthur motors.

4. The motors were inspected by removing each end shield, the apparent condition of the grease and bearing being noted without removal of bearings from the shaft. Samples of grease were removed for laboratory analysis. General checks were made to determine the condition of the winding, i.e., whether any oil had entered the stator frame. Inspection was also made to determine whether the bearings had turned in their cartridge, as well as for evidences of dirt and contamination. No new grease was added except where complete replacement was necessary, and care was taken to prevent dirt from being introduced to the original grease. If a bearing appeared rough and had to be removed from the shaft, the inner race was assumed to be disturbed, and it was then necessary to install a new bearing with new grease; and the test of that motor began or ended at this point, depending on length of service.

5. After completion of the 5-year period, all bearings and samples of grease from each bearing were sent to the manufacturer's laboratory for detailed analysis. The motors were rehabilitated with new bearings and returned to service.

Classifying Results

The bearing and grease conditions observed during motor inspections were classified as in Table 1. Condition of 34 motors at the completion of the 5-year test average is summarized in Fig. 2.

Bearing inspections made at the manufacturer's service shops in order to be nondestructive were necessarily limited to visual and audible test. In this way the accuracy of classification is not precise; and, except for complete failures or readily noticeable defects, the bearing condition is described as satisfactory on the test chart. However, this is not true of the grease because samples were taken at each inspection, and laboratory analysis made.

Motor load, as indicated on the test chart, was taken by spot check at completion of the test period, and pos-

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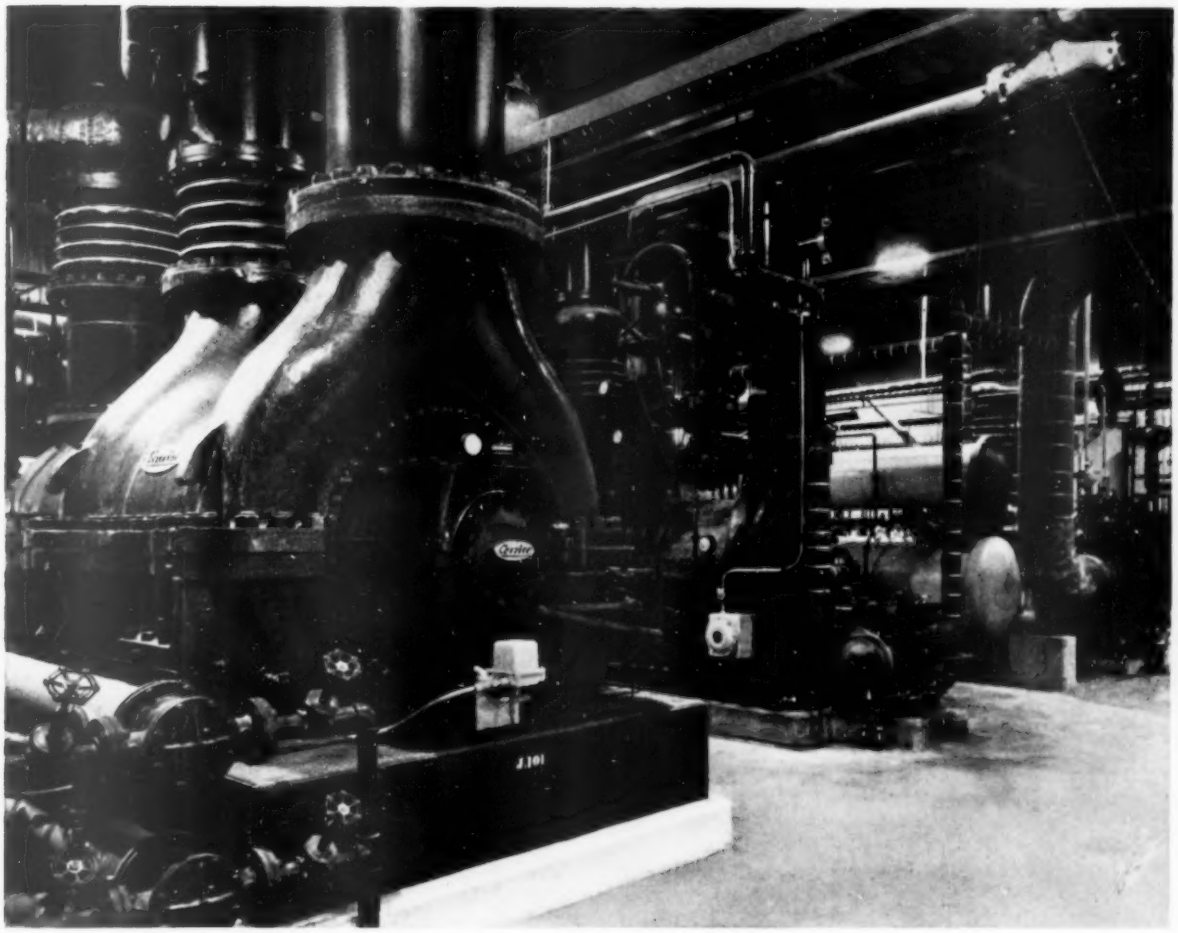
When The M. W. Kellogg Company built one of their new "Orthoflow" Fluid Catalytic Cracking Units—at Ponca City, Oklahoma—for the Cities Service Oil Company, Carrier Centrifugal Compressors were selected for 3 different functions in the process. • Left to right in the picture you see: A Carrier Centrifugal Air Compressor which supplies the better than 26,000 cfm of air used to regenerate the catalyst. A Carrier Centrifugal Gas Compressor which handles the hydrocarbon gases for the light ends recovery system. A Carrier Centrifugal Refrigerating Machine which



makes the first use of direct expansion refrigerant "Freon-12" for overhead gas recovery. • Prior to "Orthoflow" with its lower elevations, simplified catalyst system and low initial cost, Kellogg had already engineered more than 70% of the world's fluid capacity. The 3 centrifugals selected owe their dependability and simplicity to a similar background. In more than 30 years of manufacturing multi-stage centrifugal compressors, Carrier has produced more than any other manufacturer. Do you have a compression job? A Carrier Centrifugal will do it better. Write Carrier Corporation, Syracuse, New York.

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PR 20

TABLE 1—BEARING AND GREASE CONDITIONS

Grease	Bearings
Excellent—Like new grease in all respects. (See grease specifications.)	Smooth-running; no corrosion or wearing of bearing parts; like new.
Satisfactory—Some discoloration; low acidity; little or no free oil; lubricating well; no odor.	Smooth-running; small amount of metal defects; not harmful in operation.
Poor—Bad discoloration; free oil; some caking or hardening; insufficient lubrication; rancid odor.	Rough-running; some apparent wear and corrosion.
Failed—No lubrication; completely hardened or slumped away from bearing; black color; low oil content, 60 to 70 per cent; high acidity; granular.	Very rough; extreme wear with imminent failure.

sibly may not represent an average load over the 5 years. However, all motors are driving centrifugal pumps for a continuous process unit, with substantially constant throughput, and it is reasonable to assume fairly constant horsepower output.

In order to evaluate the motor-failure rate over the test period, the test motor failures are compared with similar motor failures at the Point Breeze refinery during 1952, on an annual percentage basis, as follows (figures in per cent):

	Test motors	Pt. Breeze refinery motors
Motor failures (windings)	1.1	2.0
Motor failures (bearings	2.2	2.5

By further definition, the winding failures include all complete rewinds regardless of cause, and exclude minor work such as terminal lead repair and winding revarnishing. The bearing failures include all bearing replacements where failure either occurred or was imminent. The comparatively low winding-failure rate for the test motors is understandable, inasmuch as these motors are still relatively new as compared to all other refinery motors where the failure rate is approximately twice as great. This is somewhat offset by our experience that the higher winding-casualty rate is with the smaller motors, such as we tested.

Evaluation of the bearing-failure rate is more difficult, as the influencing factors are many and, because of the nature of the test, they have more pronounced effect on bearing life. The bearing-failure rate for the test motors is less than what may be considered normal for the Point Breeze refinery. This could be construed as supporting evidence for a 5-year lubrication plan on the basis that all bearings would be replaced at the end of this period. On the other hand, the average condition of the bearings and lubricant, as shown in Fig. 2, indicates that further improvement should be made first, possibly to the point where the peak of the curve coincides with a **satisfactory** condition. Bearing replacements with a 5-year plan would be high (20 per cent), but savings would result primarily from less unscheduled outage time.

Note that a recent survey by Standard Oil Co. (N. J.), covering more than 13,000 motors at various locations in its system, indicated that approximately 2 per cent of the motors require rewinding each year. We do not have any similar figures on bearing failures with which to make a comparison.

Analysis of Test Data

In general, all bearings inspected after the test reflected the condition of the lubricant, particularly in the more advanced stages of deterioration. However, all of the grease samples do not follow the same life pattern. This raises the question as to which of the many variables encountered plays a controlling part in determining the life of the bearing and grease. An attempt was made to correlate factors which tend to increase bearing temperature—such as motor load and bearing clearances—with conditions found after 5 years of operation. These data offered no evidence whatsoever that any of these factors noticeably influenced the test results. Had the range of motor sizes been greater, however, this may not have been the case.

Effect of speed . . . As the motors and pumps were direct-coupled, the radial load on the bearings, aside from that caused by misalignment, is determined by the weight of the rotor, which is insignificant for the bearings used. The speed, on the other hand, is most important, as the effect of even the slightest degree of tightness or roughness in the bearing is multiplied at higher speeds. In this connection, note that practically all published, successful tests of this type to date have been at 1,800 r.p.m. or less.

The motor-condition pattern, based on the classification of the worst bearing and grease in each motor as shown in Fig. 2, closely resembles the familiar probability curve which, according to the bearing manufacturers, applies as well to bearing life.

Operating period . . . Assuming that all the grease used for this test came out of the same batch, it seems reasonable to believe that, aside from manufacturing and installation defects, the ball bearing itself is the controlling variable, whereas the grease may be considered a fixed limitation insofar as bearing life is concerned. Referring again to Fig. 2, it will be noticed that the peak of the curve representing the maximum number of motors for a given quality condition occurs closer to **poor,** thereby indicating that 5 years was too long a period for satisfactory results.

Unfortunately, however, there are no means of determining the proper operating period except by arbitrary selection—which, in this case, would be somewhere between 3 and 4 years. This also points out the uselessness of removing a single motor at periodic intervals for bearing inspection. It is unlikely that the motor chosen would be representative.

Grease characteristics . . . The condition of the grease after test varied considerably among motors, but the characteristic physical changes leading to failure were generally common to all grease samples. These characteristics were previously listed under grease classification. It was observed that only a small portion of the grease in the reservoir contributed to lubrication of the bearing. This appeared to be caused by formation of oxidized surfaces of the grease, which would act as a barrier between a portion of the grease and the bearing. There also were layers of different colored grease in the bearing housings, further indicating that the grease was not mixing and, consequently, not being wholly effective as a lubricating medium.

In the raceways of the bearing, hardened soap was present which could not be removed by the common industrial solvents. This soap was only removable after the bearings had been cut open, thereby allowing better access to the surface. Even then it could be removed only by scraping the surface. In this connection, note that the usually prescribed method of relubricating by means of the grease gun should not be followed when operation is at extended lubricating intervals (5 or more years), as the condition of the lubricant may require more positive means of removal such as complete replacement of the bearing and lubricant.

The bearings for the most part were in good condition. Only one bearing

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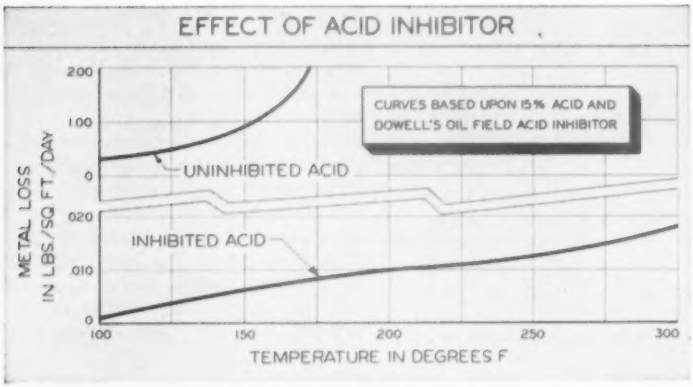

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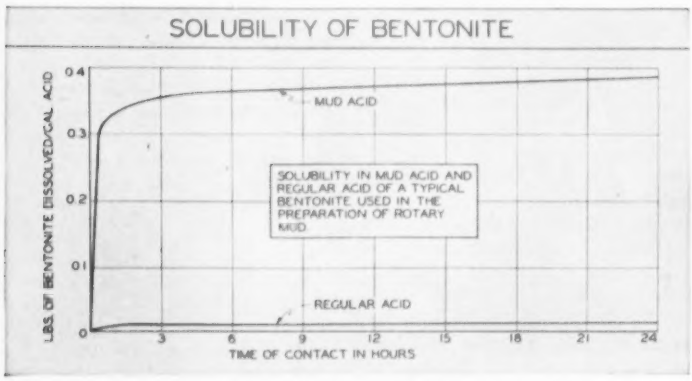
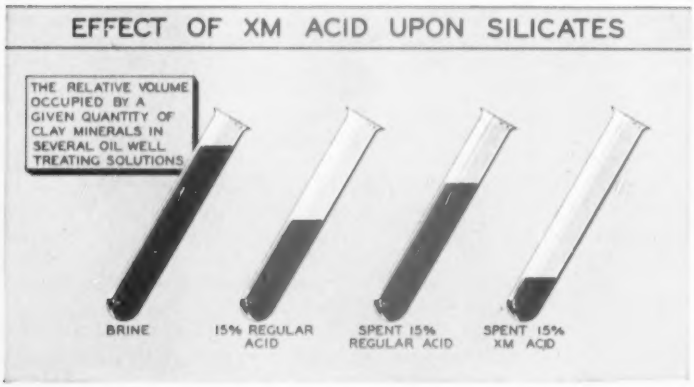


Ordinary commercial bentonite, such as is used in the preparation of drilling muds, is many times more soluble in Mud Acid than it is in regular acid.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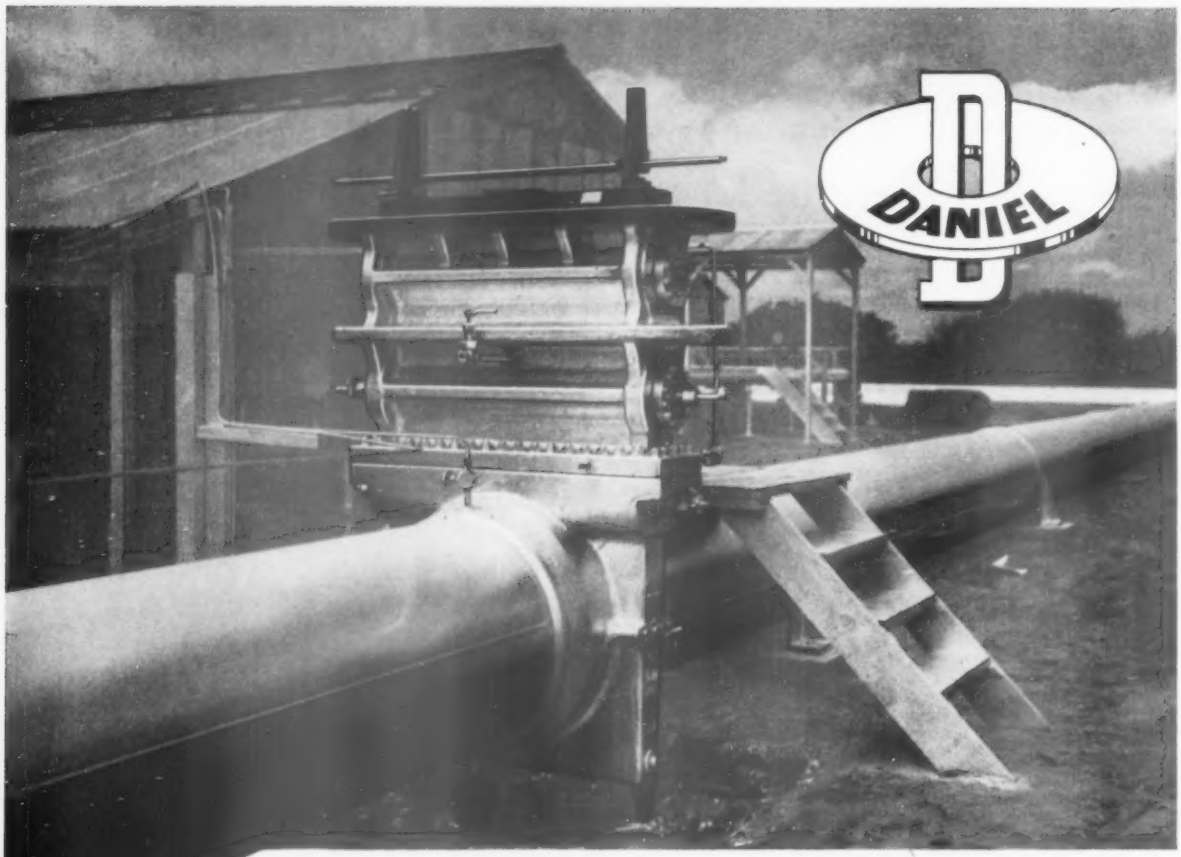

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was rusted in the raceways to the extent that continued operation would be doubtful. No actual pitting was observed in any of the bearing raceways. Approximately 30 per cent of the bearings indicated varying degrees of creep or turn in the housing, thus causing fretting corrosion of the bearing's outside diameter. The presence of soap in the bearings interfered with accurate measurement of internal clearances; but, as found, radial clearance for the most part varied between 0.0001 and 0.0008 in.; and eccentricity was within the allowable 0.0006 in. except for one manufacturer, four of whose bearings were closer to 0.001 in. The bearing cages were all found to be in generally satisfactory condition.

Better Greases and Bearings

Test results support the generally recognized trend toward completely sealed bearing-housing construction and extended lubrication intervals. In fact, the Atlantic's Port Arthur refinery, as a result of its experience with this test, has initiated a permanent program with motors through 25-hp. capacity, scheduled for 3-year lubrication intervals. From an engineering standpoint, the 3-year interval appears to be sufficiently on the conservative side, and is recommended for the present.

Greases, the most important factor in this type of operation, are being continually improved. Atlantic, for example, has recently developed, and has under test, a ball-bearing grease which promises to fulfill wishes for 5-year operation, and it is assumed that other grease manufacturers similarly are moving ahead in product quality.

Although the search goes on for improved lubricants, it is essential that, at least for 3,600-r.p.m. operation, motor bearings be selected for smoother running quality by noise-level test, and sufficient radial clearance should be provided to minimize the possibility of tight operation at maximum motor temperature. As most leading motor manufacturers maintain close quality control over ball bearings used in their equipment, this selectivity should receive considerably more attention from the refinery maintenance people when replacements are made for 3,600-r.p.m. machines.

With improved greases and bearings made available to the motor manufacturer, it then becomes his responsibility to make the most effective use of these items through improved motor design.

The aim of tests such as described here is to obtain motors which can be installed and forgotten, except for exterior cleaning. This periodic cleaning, as highlighted by the test, is extremely important for proper operating temperature and resulting life of the lubricant, the oxidation rate of which increases approximately 50 per cent for each 10° C. rise of bearing temperature. This cleaning is essential also to winding life and motor-finish protection.

The reduction of motor maintenance is made possible in no small way by use of totally enclosed frame construction. Except for a few signs of oil leakage into the stator frame, every motor involved in this test came through with windings which looked like new. This lends further support to Atlantic's policy of using totally enclosed motors exclusively in refinery service.

Acknowledgment

The authors wish to acknowledge the contributions and cooperation of the General Electric Co. during the 5-year motor test.

BOOK

THE AUTOMATIC FACTORY: MECHANIZATION VS. WORK EFFORT. By John Diebold. Published by Research Division, California Personnel Management Association, 2180 Milvia Street, Berkeley, Calif. $1.

This is a stenographic brief of an address presented before the association. The author discusses the problems which automation has brought and how they are being coped with.

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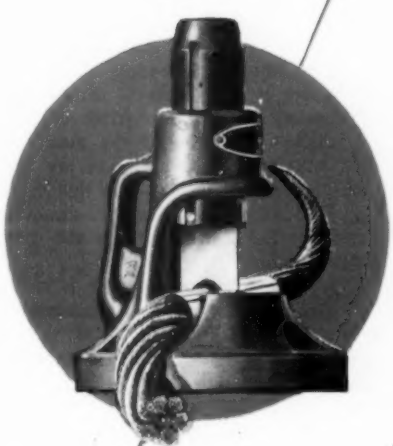

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. . . UNIT AGREEMENTS

. . . and methods of participation

Despite recent concepts of the factors which should be used in participation formulas, the industry can not relax its efforts to effect even more improvement

by E. B. Miller

THE well factor has been used in many formulas, both in primary pressure-maintenance and secondary-recovery projects. This factor represents to some degree the investment; but, of more importance, is its averaging effect. In the majority of the fields unitized, the density to which they have been drilled is fairly uniform and when a well is considered by itself, it does not in any way reflect the quantity of products underlying it, except in the case of a dry hole.

When this factor is used in a formula, in combination with either rate of production or a factor which represents volume, it modifies their effect on the resulting participation. The larger the weight that is given to the well factor, the less difference there will be in the relative participation of different tracts. The result of using a well factor in a formula which includes volume is to increase both the rate of income and ultimate recovery for those properties which are below the average volume per acre of the field, if the volume is used as the base line for comparison.

If rate of production is used as one of the other factors in the formula, the well factor has the same effect. Leases which have less than average producing rate will receive a larger portion of the total production, provided they have been drilled to the average density of the unit.

Surface acres have been used as a factor in participation formulas, especially in fields where relatively little is known about the character and extent of the reservoir, and in fields where there is comparatively little difference in the volume of pay underlying the various tracts to be included in the unit. Several units are now being formed on the surface-acreage basis; and when, through additional development, adequate information is available upon which reliable calculations can be made, the method of participation will be converted to a volumetric or acre-foot basis.

Oil in place . . . The recent trend in selecting participation formulas is to include some factor which represents the amount of oil, gas, and condensate in place under each tract in the unit area. The volume of pay, expressed as acre-feet, is commonly used as representing the amount of these products in place. Many variations or modifications of the straight acre-foot determination have been employed, such as, net acre-feet of pay, gross acre-feet of pay, or adjusted acre-feet.

Where it is possible to differentiate accurately between productive and nonproductive portions of the zone, the net acre-foot determinations are generally used; however, when this is not possible, the thickness of the total zone is used to determine the gross acre-feet.

In two-phase reservoirs it is necessary to establish some relationship between the oil and gas phases of the reservoir. One method by which this can be accomplished is to establish values per acre-foot for oil and for gas and then multiply the oil acre-feet by an amount which would adjust it to the value of the gas acre-foot. The resultant value is called adjusted acre-feet. To establish relative values between an acre-foot of oil sand and an acre-foot of gas sand requires that recovery factors must be established for each and that a dollar value for the oil, gas, and condensate must be determined.

A number of the participation formulas include a reserve or recoverable-oil factor which is essentially the same as using acre-feet as long as uniform recovery per acre-foot values are used. Inasmuch as there are comparatively new fields which have an oil-in-place or an acre-foot factor in the proration formulas, there are few cases where the current rate of production is in proportion to the reserves. This is especially true of oil reservoirs. It is obvious that if only the amount of oil in place, as indicated by either reserves or acre-feet, is the only factor in the participation formulas there will be readjustment in current income in proportion to the variation of oil in place under the various tracts in the unit. It is for this reason that many of the formulas include other factors which will tend to modify this adjustment.

Applications in Certain Fields

To consider the actual application of the various participation formulas, several fields have been selected which have been unitized on the basis of formulas which include one or more of the factors discussed.

North Cowden Field

There is a gas-injection program now in operation in North Cowden field, Ector County, Texas. Prior to the inception of the program, it was recognized that some form of unitization would be required. The plan of injection agreed upon by the operators was one of dispersed injection into wells located on a relatively uniform pattern throughout the field. Because this method did not result in the movement of oil over long distances, it was decided by the operators that field-wide unitization would not be necessary and that units not to exceed 640 acres would preserve equity.

As a result of the decision, 21 separate units in the field were formed. The participation formulas provided for in these units varied from 100 per cent acreage to 90 per cent production and 10 per cent acreage. All of the other units which were formed had formulas that included both acreage and production, the most common being 50 per cent acreage and 50 per cent production over a specified 9-month period. Well investment was adjusted in various ways; but, in general, it was related to the average cost of the wells in the unit. Operating expense is prorated on the same basis as production is allocated to the participants in the unit.

The significant features are that it was unitized and placed in operation in a comparatively short period of time, considering the size of the field and the diversity of ownership, and that agreement between both operators and royalty owners was reached on so many different formulas.

One company was involved in eight units, each of which had a different participation formula. There are several important reasons why this was possible. Most of the operators agreed that it was a conservation measure for the utilization of gas, much of which was at that time being flared; and that addition oil could be recovered by the injection of this gas into the reservoir.

Because the oil would not be moved over long distances, it was not necessary to have a single large unit and there was not too

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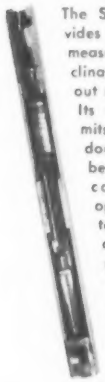

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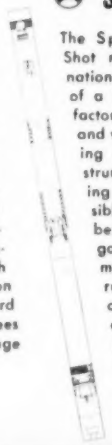

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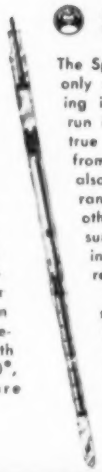

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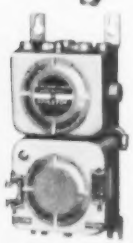

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much difference of opinion as to the relative value of the individual tracts to be joined together in the 640-acre units. In most cases, the current income was not drastically changed and operating economies were possible. All of these factors combined contributed to the prompt and successful manner in which the project was initiated.

Kelly-Snyder and Diamond "M" Fields

One of the most recent unitization projects to become effective is the Canyon reef pool of Kelly-Snyder field and Diamond "M" field, Scurry County, Texas. This agreement became effective on March 1, 1953.

Early in 1951, the operators in this field initiated steps to determine whether pressure maintenance would result in the additional recovery of oil from this large reservoir; and, if so, what type of operation would result in the greatest ultimate recovery and also preserves equity between individual operators and royalty owners. It was concluded that pressure maintenance by the injection of extraneous water and the injection of a portion of the produced gas would be the most effective method of operation and that field-wide unitization would be necessary to preserve equities.

Participation formula selected was 75 per cent gross acre-feet and 25 per cent well, a full well credit being defined as one which would produce an average of 50 bbl. per day for at least a 4-day period. Field-wide unitization was considered necessary because the plans of operation involved the movement of oil from one lease to another in order to achieve the maximum efficiency.

The factor of gross acre-feet in the formula is indicative of the amount of oil under each tract and the per-well factor serves to modify the effect of the acre-foot factor because the field was developed on an average density of one well to about 40 acres.

The productive reef in this pool varied from a few feet to several hundreds of feet in thickness. By using gross acre-feet in the formula, consideration was given to the amount of oil in place under each individual tract. The well factor in the formula modifies the effect of the acre-foot factor by giving those leases which have less than average thickness a larger percentage of the current and ultimate production than they would have obtained had the formula consisted only of the acre-foot factor.

The tracts with less than average reef thickness will be allocated less production and those with above average reef thickness will be allocated more production, if the production assigned each tract by the participation formula is compared to the current allowable permitted by the proration formula, which is 50 per cent acreage and 50 per cent well. On March 1, 1953, 95 per cent of the working interest and 92 per cent of the royalty interest had executed the unitization agreement, so it is apparent that this formula was acceptable to the large majority of the interests in the field. In the author's opinion this is the real test of whether or not a formula is practical and workable.

Old Ocean Field

Old Ocean field, located in Brazoria County, was unitized in 1947 and the participation formula was on the basis of adjusted acre-feet. The field is quite complex both structurally and in the accumulation of the hydrocarbons. There are multiple sands, some of which contain only gas and condensate and others which contain oil as well as large accumulations of gas and condensate.

To obtain the maximum recovery from the field, it was decided to carry on a cycling program and that a field-wide unit would

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be necessary to preserve equities as among operators. After considerable study, it was agreed that each acre-foot of oil sand would be equivalent to 3 acre-ft. of gas sand, and adjusted acre-feet were determined by multiplying the acre-feet of oil sand by three and adding to that number the acre-feet of gas sand.

Investment and expense are allocated on the participation of each operator in the total number of adjusted acre-feet in the field. As previously mentioned, this is a multiple-sand field and adjusted acre-feet were determined for each reservoir; and income is allocated on the basis of participation in the zone from which the production is currently being obtained.

To arrive at a relatively value between an acre-foot of oil sand and an acre-foot of gas sand, it was necessary to first determine a recovery factor so that the relative quantities of each product to be recovered could be estimated. In addition to establishing the quantity of each product, the relative prices had to be considered. As there was no provision in the unit agreement for a revision of the three to one factor, the price relationship and recovery factors originally determined will apply throughout the productive life of the field.

Karon Field

The operators in Karon field, located in Live Oak County, Texas, are now engaged in forming a unit. A gas-injection program is contemplated and field-wide unitization is considered necessary to preserve equity.

Method of participation being considered is based on two separate participation factors, one which will apply to oil and the other to gas and condensate. The recovery of oil will be allocated on the basis of acre-feet of oil sand, and the allocation of gas and condensate will be based on the acre-feet of gas sand underlying each of the tracts.

As this field has a large gas cap and a relatively thin oil column, it is anticipated that the production to be obtained from the wells will be a composition of both oil and condensate. Therefore, it is necessary that the relative amounts of each product be determined. To do this, a mixing curve has been prepared by taking a sample of oil from a well producing with a solution gas-oil ratio and another sample from a gas well. These were combined in varying percentages at reservoir conditions to furnish the data for the curve. The resultant curve shows the percentage of oil throughout a range of specific gravities. The unit agreement provides that the total production from the field shall be divided between oil and condensate on the basis of this curve, and these amounts will be allocated in relationship to the equity in the oil acre-feet and gas acre-feet.

By using the mixing curve to distinguish between oil and condensate production, it is possible to eliminate the necessity of estimating recovery factors for either the oil or gas zone. This division also eliminates the necessity of arriving at a relative dollar value of these products, as was necessary in Old Ocean. The elimination of these two estimates has made it possible to reach an agreement on the allocation formula much sooner than by using an adjusted acre-foot factor, as there was a wide variation in the opinion of the operators on the recovery factors.

The mixing curve is considered to be accurate within 1 or 2 per cent, which is probably much more accurate than the recovery factor can be determined or the price relationship between the products can be predicted over a period of time. It is the author's opinion that this type of formula has considerable merit and should be investigated for use in methods of participation in units which are being formed in fields which contain both oil and free gas.

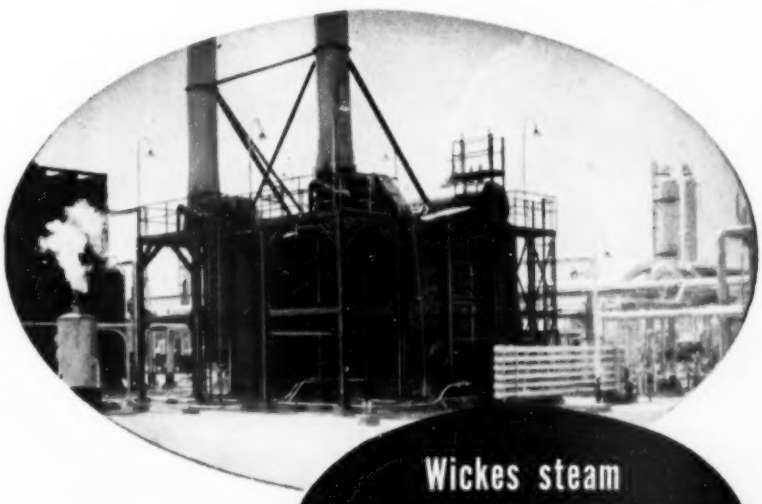
Salem Field

The effect a participation formula will have on current income is one of the most important considerations of both operators and royalty owners. Most parties are willing to accept the premise that the ultimate recovery will be increased; but others, for various reasons, are primarily concerned about immediate effect on their current income.

There have been several fields, especially those being unitized for secondary recovery, where the formula has been designed to minimize the immediate raising or lowering of current income. The formula used in the agreement for field-wide unitization of Salem field located in Marion County, Illinois, is a good example. Two methods of participation were developed, one of which was the participation in primary reserves and the other participation in secondary reserves.

The formula for participation in the **primary reserves** was based on the percentage of the daily oil production from each tract during the period July 1, 1947, to July 1, 1948, compared to the daily average production from the total participating area for the same period. In other words, this formula is based on 100 per cent production.

The participation for **secondary reserves** was based on 100 per cent acre-feet for the Benoist-Aux Vases and Renault sands, and 100 per cent surface acreage on the McClosky lime and Devonian lime formations. Each of these factors was separately weighted by the ratio which the respective estimates



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from each of the three sources bears to the total secondary recovery. The weighted results of this determination constituted a single secondary-recovery participation factor. The effect of using two formulas, which has been referred to as the "split formula," is to maintain income at approximately its current level during the transition period from a primary-recovery to a secondary-recovery operation.

In the above formulas, the primary-recovery factor was to apply until such time as the estimated primary reserves were produced, which in this case amounted to 33,360,784 bbl. After the primary reserves had been produced, the formula applicable to secondary-recovery reserves would then become effective.

In reviewing the percentage of equities of several of the individual tracts in this unit, it is noted that considerable difference exists between the participation under the primary-recovery and the secondary-recovery formulas. If only the secondary-recovery formula had been employed, there would have been a readjustment of current income of some magnitude to a great many of the operators.

ARKANSAS

Name of unit and basis of participation

Dorcheat-Macedonia—Acre-feet of Smackover lime pay underlying unit area.

McKamie-Patton—Adjusted acre-feet, Oil sand 1.54 times gas sand.

Shuler—Allowable oil production for August 1940.

Wesson-Hogg sand—Acre-feet of net Hogg sand pay underlying each tract in field.

ILLINOIS

Iron—Current production, one-third; acre-feet of pay, one-third; accumulative production, one-third.

North Calvin—Proportioned to ratio of acre-feet of Pennsylvanian sand underlying water-flood area.

Odin—Reservoir volume and primary production at time of agreement.

Salem-Lake Centralia—Split formula: (a) Primary reserves allocated on daily average production during 1-year period. Remaining primary reserves estimated at 33,360,748 bbl. (b) After primary oil recovered, acre-feet for the Benoist-Aux Vases and Renault sands and surface acres for McClosky and Devonian limes were weighted to a single participation factor for allocation of secondary-recovery reserves.

Salem-Rosiclaire unit—Number of wells.

Tar Springs (South Mauncie)—Surface acreage.

Waltersburg unit—Acre-feet of pay sand.

West Dale Water Flood—Arithmetical average of cumulative and present production.

KANSAS

Beal—Mutual agreement based on several factors: wells, production, etc.

Browning—Productive acres, accumulated recovery, current production.

Clopton—Number of wells, accumulative production, current production.

Lamont—Number of wells, accumulative production, current production.

Kipfer-McGilvray (Madison)—Oil wells, cumulative production, current production.

Ladd unit (Sallyards)—25 per cent wells, 25 per cent cumulative production, 25 per cent current production, 25 per cent production acreage.

Seeley—Number of wells and floodable acres.

Teter—Number of wells, accumulative production, current production.

LOUISIANA

Benton—100 per cent recoverable reserves.

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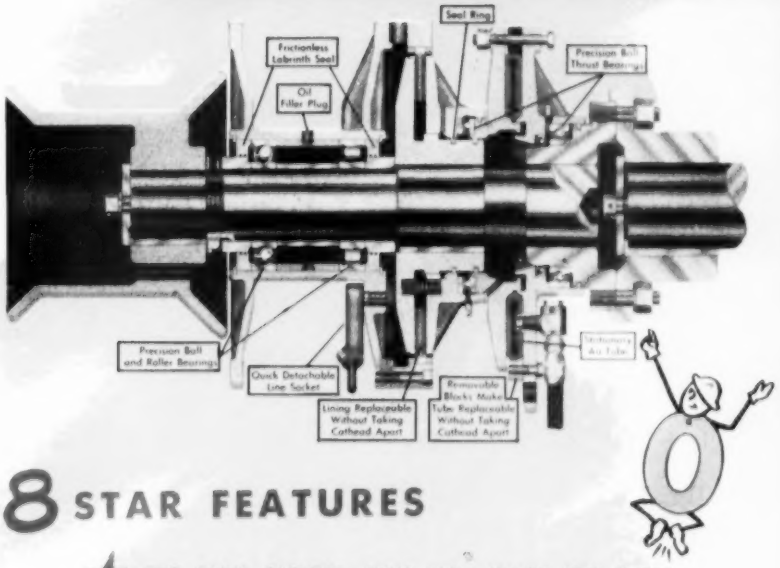
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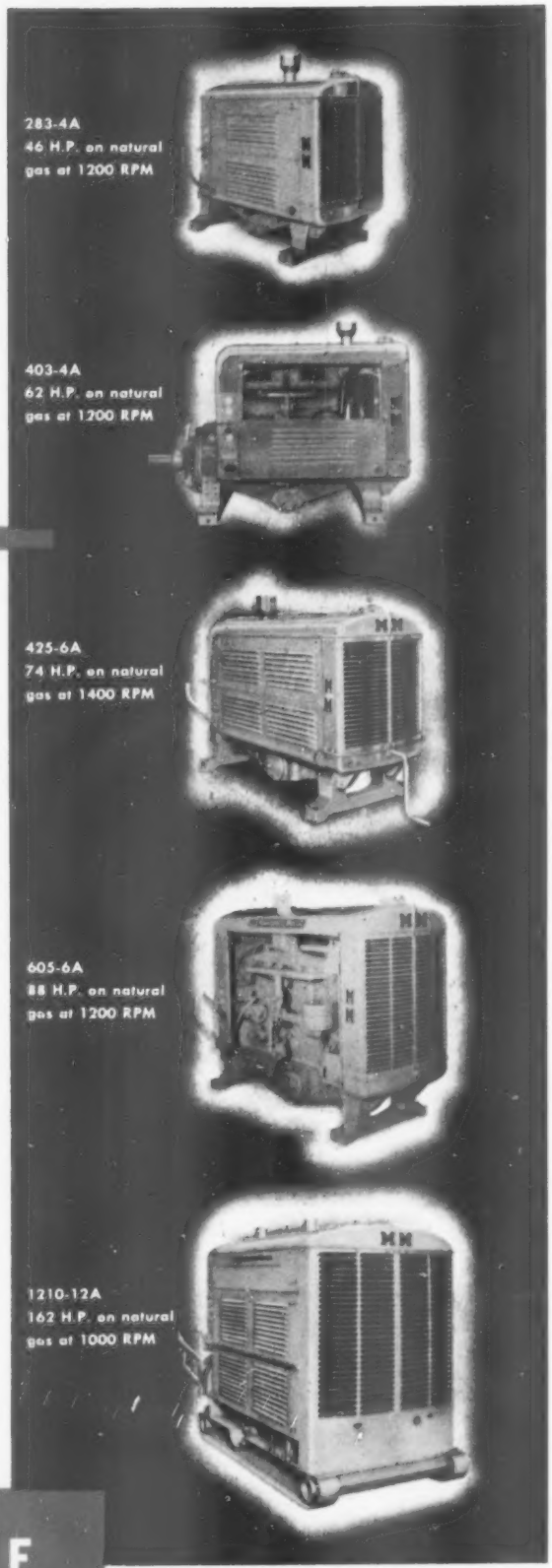

283-4A
46 H.P. on natural
gas at 1200 RPM

403-4A
62 H.P. on natural
gas at 1200 RPM

425-6A
74 H.P. on natural
gas at 1400 RPM

605-6A
88 H.P. on natural
gas at 1200 RPM

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Delhi—50 per cent (oil acre-feet plus one-thirteenth gas acre-feet), 50 per cent production over 3-month base period.
Erath—100 per cent value of hydrocarbons in place on 6-1-42.
Haynesville—50 per cent (70 per cent 300 psi. b.h.p. plus 30 per cent acre-feet), 50 per cent current production.
Holmwood—100 per cent acre-feet.
Lake St. John—Value of recoverable hydrocarbons in place.
Longville—Acre-feet.
North Tepetate—100 per cent surface acres.
South Jennings—100 per cent surface acres—originally 100 per cent acre-feet after approximately 2 years lower and upper units 100 per cent acre-feet, middle unit 100 per cent value reserves in place.
South Sarepta—100 per cent value of recoverable hydrocarbons w/future recomputations.
West Hackberry—100 per cent acre-feet.
West Tepetate—Value of recoverable hydrocarbons.

MISSISSIPPI

Brookhaven—100 per cent oil acre-feet.
Cranfield—Value of recoverable hydrocarbons in place.
Hub-Tuscaloosa—100 per cent recoverable hydrocarbons.

NEW MEXICO

Fowler (South Mattix unit)—Surface acreage.
Langlie—Estimated future recovery from date of agreement.

OKLAHOMA

Billings—Surface acreage, acre-feet effective sand, number of wells contributed.
Ceres—Two-thirds primary and secondary oil in place; one-third wells.
East Pauls Valley—Accumulated production, daily average production, lease acreage.
Elk City—50 per cent wells and 50 per cent hydrocarbons in place.
Fish Pool—Number of wells, cumulative gross production and current daily production.
Grief Creek—100 per cent recoverable oil reserves (split, three separate periods).
Leonard—100 per cent surface acres.
Middle Burbank—Percentage of working interest determined from productive acres, cumulative and current production.
Naval Reserve—Productive acres, production 1949, cumulative production.
Northeast Elmore—50 per cent acre-feet times b.h.p. times oil potential and 50 per cent adjusted potential. Potential defined as ability to produce up to 125 bbl. without regard to ratio. Adjusted potential same with maximum gas-oil ratio of 1,200 cu. ft. per barrel.
Northeast Jones—Primary: 100 per cent production; secondary: 75 per cent wells and 25 per cent net acre-feet.
Southwest Antioch—50 per cent acre-feet; 50 per cent daily allowable.
West Edmond—50 per cent acre-feet times b.h.p.; 50 per cent daily allowable.

TEXAS

Anton-Irish-Clearfork—50 per cent stock-tank oil in place, 50 per cent production (3-month base period).
Brown County Regular—Surface acreage.
Burnell-North Pettus—100 per cent acre-feet, effective sand.
Carthage field—Buster, Hill, lower Pettit and Travis Peak zones on surface productive acres. Upper Pettit on the basis of gross pay.
Cedar Lake—50 per cent surface acres; 50 per cent production (3-month base period).
Chesterville—100 per cent surface acres un-

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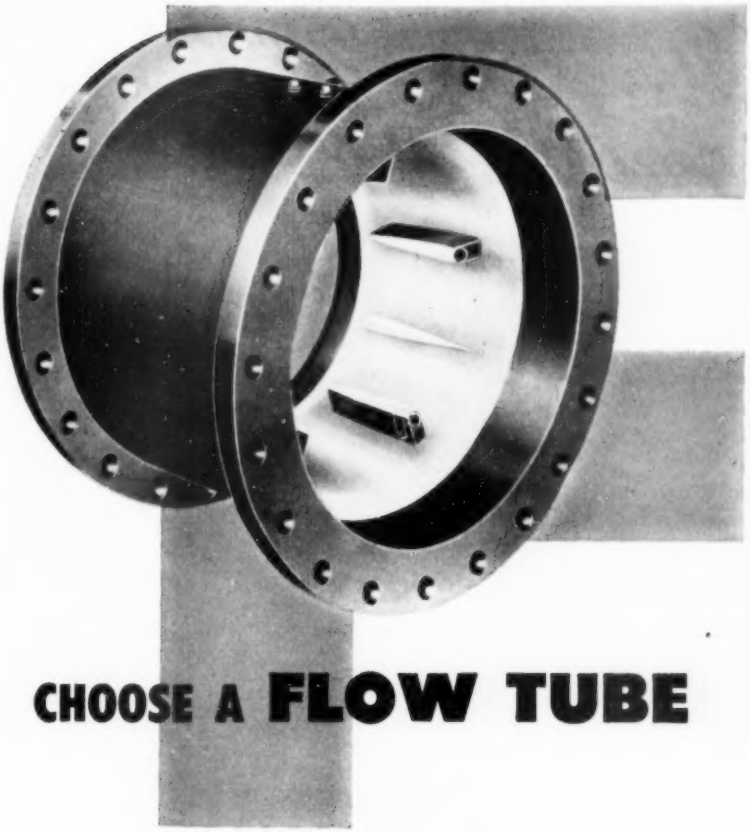

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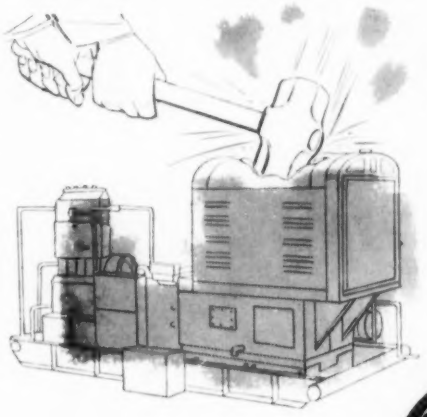
til 100 per cent acre-feet are determinable (5 years).
Cogdell—75 per cent gross acre-feet; 25 per cent per well.
Diamond "M" field—75 per cent acre-feet; 25 per cent per well.
Donnell unit—None specified.
Fairbanks—100 per cent value of recoverable products.
Fort Chadbourne—100 per cent gross acre-feet times b.h.p. times capacity.
Fullerton—50 per cent acre-feet times b.h.p.; 50 per cent current production.
Gibson field—Reserves.
Goldsmith-San Andrus—Present oil in place, current production.
Hardy field—Number of wells.
Harper—50 per cent cumulative production; 25 per cent current production; 25 per cent wells.
Hilbig—Oil in place.
Hildreth—Remaining recoverable reserves by primary recovery.
Jameson field—50 per cent R.R.C. allowable; 50 per cent adjusted acre-feet.
Karon—100 per cent adjusted acre-feet, employing a mixing curve.
Katy-Gas—100 per cent surface acres within units, units participate on acre-foot basis.
Kelly-Snyder (SACROC)—75 per cent acre-feet; 25 per cent producing wells.
Kirby field—Net acre-feet of pay.
Kirk field—25 per cent per well; 75 per cent effective pay.
La Gloria (Oil)—Acre-feet of oil and allowable.
La Gloria (Gas)—Surface acres within units and unit participation on reserve basis.
La Rosa—Surface acreage and acre-feet.
Levelland—50 per cent (initial oil in place and 0.70 adjusted gas), 50 per cent (75 per cent acres and 25 per cent wells).
Luby field—Cooperative basis.
McDonald unit—Not specified.
Merigale-Paul Water Flood—Gross pay.
Midfields—100 per cent initial hydrocarbons in place less amount produced prior to 7-1-49.
Midway Lane—Acreage and wells.
Millican Reef—50 per cent acre-feet oil and gas reefs; 50 per cent wells.
Mineral—Acreage.
New Hope—Recoverable oil by primary recovery (four zones).
Nordheim—100 per cent acre-feet.
North Cowden (21 units):
Unit Block 9—Acreage.
Unit Block 38—50 per cent acreage; 50 per cent production last 9 months of 1947.
Unit Block 7—25 per cent acreage; 75 per cent production first 9 months of 1947.
Unit Block 8—50 per cent acreage; 50 per cent production first 9 months of 1947.
Unit Block 10—Production, first 9 months of 1947.
Unit Block 12—85 per cent actual daily allowable October 1, 1947, 15 per cent production, first 9 months of 1947.
Unit Block 13—90 per cent production first 9 months of 1947; 10 per cent acreage.
Unit Block 15—50 per cent acreage; 50 per cent production first 9 months of 1947.
Unit Block 19—50 per cent acreage; 50 per cent potential from R.R.C. proration.
Unit Blocks 20, 21, 27, 29, 32, 33, 35, 28, 30, 34, 14, 31—50 per cent acreage; 50 per cent production first 9 months 1947.
North Markham—Remaining reserves as of June 1, 1949.
Old Ocean—100 per cent adjusted acre-feet. Oil sand is three times gas sand.
Payton Pool—Primary and secondary remaining reserves as of September 1, 1959.
Pickton field, Unit 1—Surface acreage assigned to a well on proration schedule.
Pickton field, Unit 2—Remaining reserves as of April 1, 1952.
Red Fish Bay and Mustang Island—Surface acres then adjusted to acre-feet.
Reddin field—Remaining primary reserves as of June 1, 1950.
Salt Creek—50 per cent acre-feet; 50 per cent productive acres.
Sharon Ridge—50 per cent gross acre-feet; 50 per cent wells.
Sheridan—Varied; part of unit 100 per cent acreage; part acre-feet; part agreement.
Shield—100 per cent surface acres.
South Esperson Dome—None specified.
Tjerina-Canales-Blucher—Acre-feet of sand under each operator's tract or lease.
Three Bar—75 per cent recoverable oil in place; 25 per cent production (3-month base period).
Todd-Crinoidal—100 per cent acre-feet.
Turkey Creek—Acre-feet of oil-saturated sand.
Van—Acreage within unit (2½ years) then ultimate yield.
West Bernard—Two factors: condensate allocated on acre-feet times barrels per million for each zone weighted to one factor; gas allocated on acre-feet.
West Ranch—100 per cent acre-feet.
West Tuleta—Acreage.
Willamar West field—50 per cent per well; 50 per cent oil acre-feet.
Williams—Amount stock-tank oil and gas in place under tract recovery factors.
Wimberly field—Reserves.

Author with Tide Water Associated Oil Co., Houston. Portion of paper presented at spring meeting, A.P.I. Southwestern District Division of Production, Fort Worth, March 4-6, 1953.



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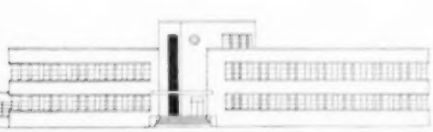

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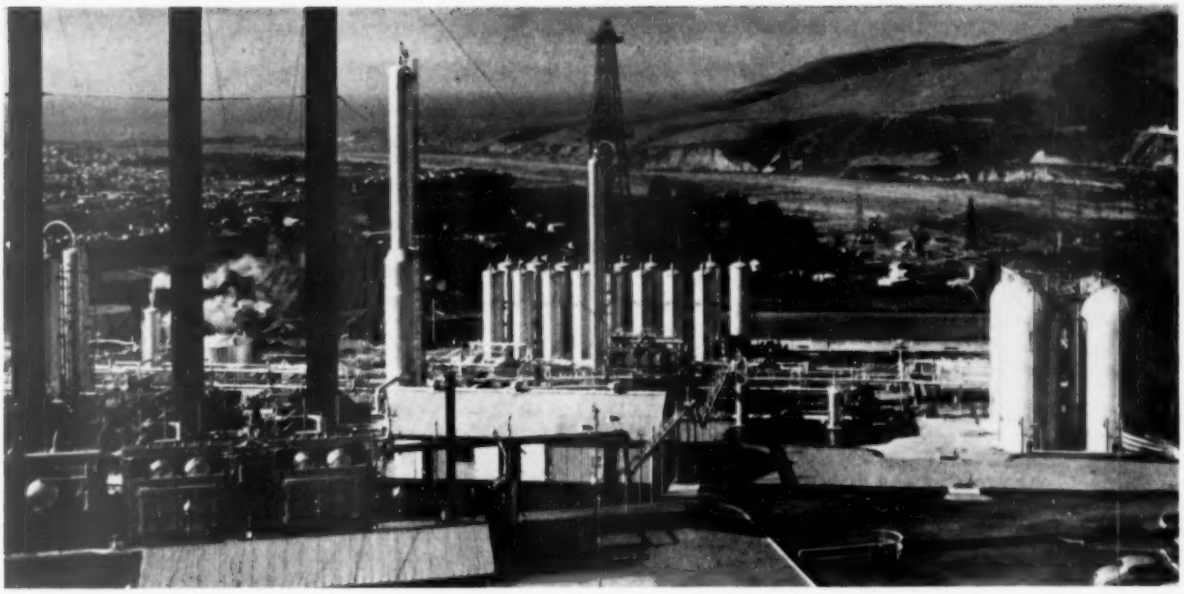


LIQUID RECOVERY EQUIPMENT . . . Metal loss data may indicate which process vessels to select for direct measurement of wall thickness.

Is Your Plant CORRODING?

The severity of corrosion in gas-condensate wells is now well recognized. It is surprising to realize, however, that almost no mention can be found in the literature of corrosion in gas-gathering systems, gas-processing equipment, or product-handling facilities. This article summarizes typical field experience with gas-plant equipment and accessories and emphasizes that corrosion is not limited to the wells alone.

by E. W. Wallace

IN a corrosive gas-condensate field, some changes were made in field piping which made it possible to inspect the flow line from a well which had not been receiving corrosion inhibition. This particular well was known to be corrosive, but the casing-tubing annulus had been packed off and filled with mud, and the use of stick inhibitors had not been fully developed at the time of the inspection. The flow line was made of 4-in. pipe with 0.437-in. wall thickness and was carrying 5 to 6 million cubic feet of gas per day at a pressure of about 2,000 psi. The gas contained approximately 3½ per cent CO_2, and an appreciable quantity of liquid water was produced at the well head. The well had been on stream approximately 5 years.

Gas-Gathering System

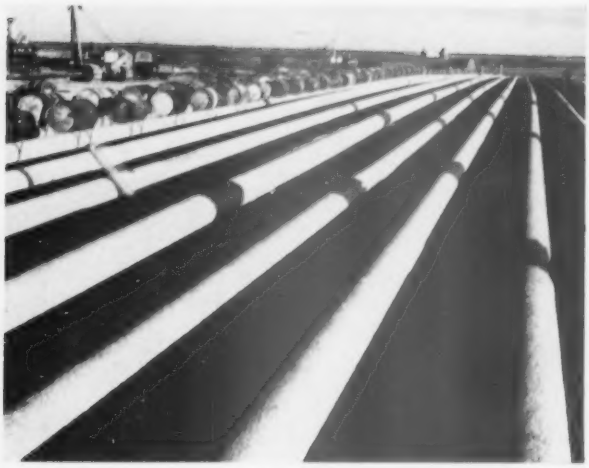
Beginning at the well head, corrosion damage was found for approximately 4,200 ft. with pits and grooving to a depth of 0.150 in. near the well which decreased in frequency and intensity downstream. In several instances pits were noticed immediately downstream from welds. These were most probably caused by local turbulence due to icicles formed during welding or to misalignment of the pipe. In this field an oil-soluble inhibitor was being used in most of the other wells, and it is believed that this chemical provided protection to the main 6-in. gathering line which carried gas from both inhibited and uninhibited wells.

At the time the above 4-in. line was inspected the pipe had sufficient wall thickness remaining to comply with the A.S.A. code for pipe operating at 2,000 psi., but the pitting rate of 30 mils per year which was observed on this flow line and the general grooving action at the bottom of the pipe would have necessitated replacement long before the end of the estimated life of the field.

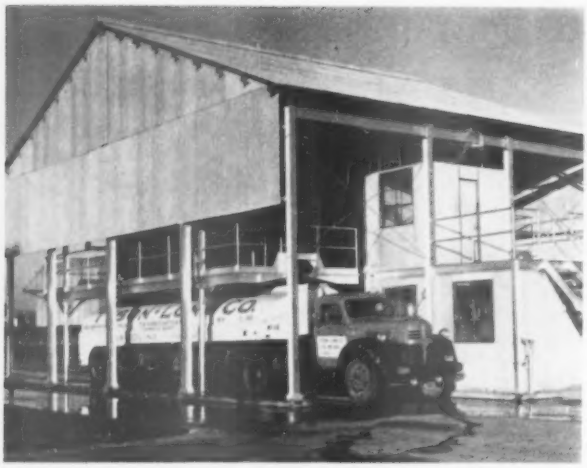
Over-all economics . . . In a more recently developed field, where the partial pressure of carbon dioxide in the gas is also greater than 25 psi., the wells were initially equipped with 12 per cent chromium christmas trees and nickel-alloy steel tubing, in an effort to control corrosion without the use of inhibitors. Since steel was in short supply at the same time, the gathering system was designed without an extra corrosion allowance.

Shortly after the new gas-processing plant went on stream, analyses of water produced at the well head and at the plant indicated corrosion of the gathering system. Inhibitor injection was begun immediately at the well heads. While it is generally true that the gas-gathering system is more accessible for cleaning and repair than the gas-well tubing, and that cheaper inhibitors can be used in the gathering system, it is now evident that the comparison of the alloy versus the inhibitor method for corrosion control should be made on an over-all basis and not confined to well economics alone.

Both of the preceding examples refer to corrosion caused by a partial pressure of CO_2 greater than 25 psi. where liquid water is present and to unitized operations where many wells are connected to a central plant. For single,



GATHERING SYSTEM . . . Comparison of corrosion-control methods should be made on an over-all basis.



PRODUCT LOADING . . . Severe corrosion may occur in product flow lines. Such corrosion is quite severe near the plant.

isolated wells, it would appear that this type of corrosion could be controlled in some gas-gathering systems by dehydrating the gas at the well head. There is also the possibility that operation of the gathering system at a somewhat lower total pressure might reduce the partial pressure of carbon dioxide below that necessary for this type of corrosion.

Effect of oxygen . . . As long as the gathering system is operating at some positive pressure above atmospheric, corrosion caused by air leaking into the system is unlikely. In vacuum systems, however, it is generally quite difficult to exclude air completely. The corrosion of wet steel by oxygen from the air is widely known, and gas-gathering systems are not immune to this form of attack.

The accelerating effects of oxygen are most severe in systems containing hydrogen sulfide and in this latter case dehydration of the gas will not be effective unless it is repeated at rather short intervals throughout the system. This is because of the reaction between hydrogen sulfide and oxygen which produces additional water downstream from the dehydrator.

Liquid Recovery Equipment

In common practice, the gathering system delivers gas to a scrubber where part of the water and liquid hydrocarbons are separated. Both oil-soluble and water-soluble corrosion inhibitors are automatically removed from the gas stream at this point. Carbon dioxide, hydrogen sulfide, acetic acid vapor, some water vapor, and oxygen, (if present) all tend to follow the gas stream through the remainder of the processing equipment.

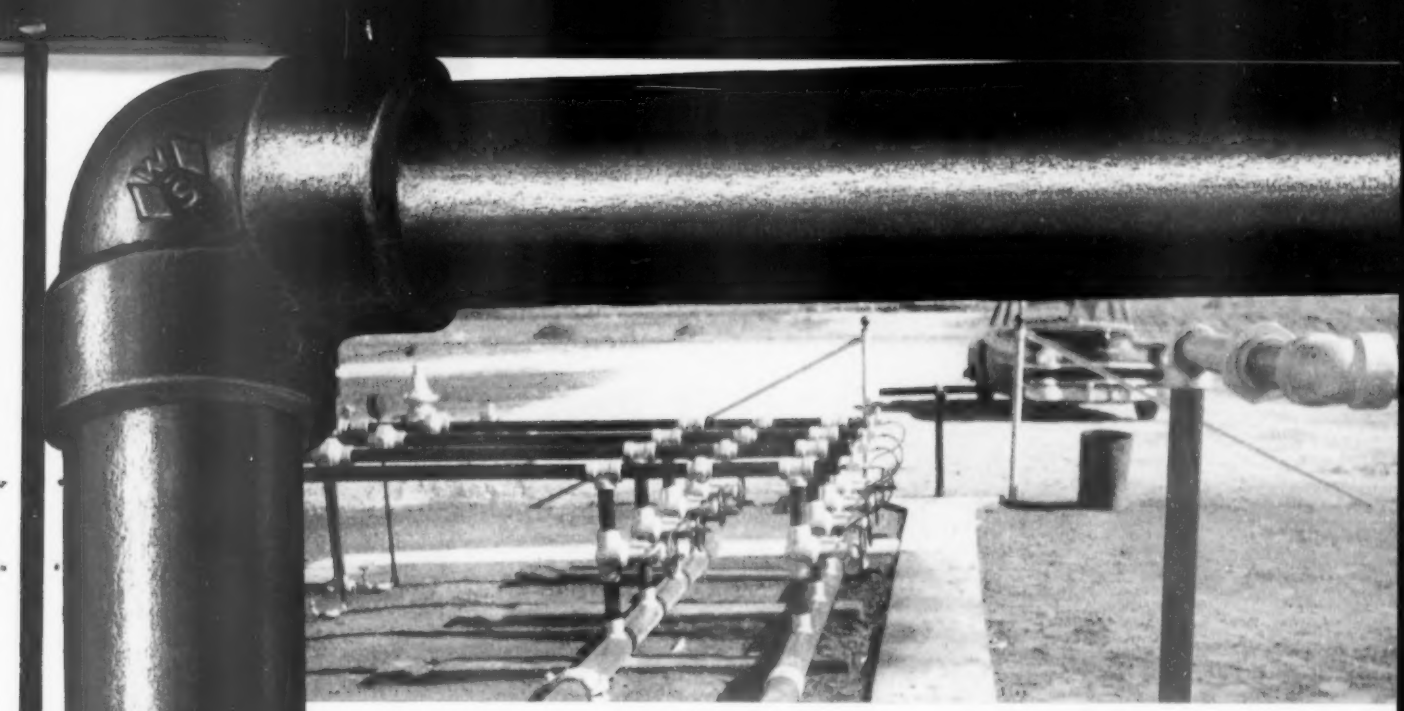
A useful method for making a reconnaissance survey of corrosion in process vessels is to measure the amount of water drained from each of the vessels over a convenient period of time and to determine the iron content of this water. In one sweet-gas plant, the following metal-loss data were obtained; gas-gathering system, 700 lb. per year; inlet scrubber - flash tank system, 35 lb. per year; still water drain, 12½ lb. per year; still reflux tank, 512 lb. per year (before treatment with soda ash this rate was 1,780 lb. per year); gasoline run tank, 197 lb. per year; deethanizer reflux tank, 177 lb. per year; and depropanizer reflux tank 1.4 lb. per year.

Measuring wall thickness . . . Since we can measure the metal surface area exposed to corrosion in these vessels and systems, it is possible to convert these metal-loss data into mils per year general corrosion rates. Unfortunately, however, the corrosion attack is often concentrated in the bottom of a vessel, below the standing water level, and pitting has been found to proceed at 2-6 times the general corrosion rate in this zone. Accordingly, it is necessary to make direct measurements of metal thickness in order to determine whether or not a serious operating problem exists.

The value of the metal weight-loss data lies in selecting particular vessels for direct thickness measurement. In the example just given, it was evident that the wall thickness of the still reflux tank should be measured by some direct means whereas it is not at all likely that the depropanizer reflux tank needed further inspection.

Ultrasonic measurement . . . There are several means for making direct meas-

PRODUCT STORAGE . . . Although relatively not serious, corrosion in sweet-product storage tanks cannot be completely ignored.



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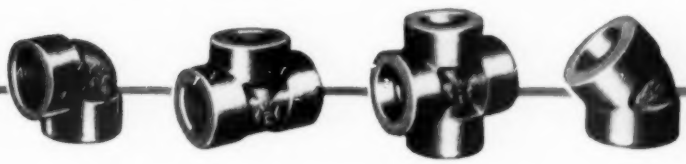

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urements of vessels wall thickness. For example, the Audigage metal-thickness instrument has been used to make measurement where it was not possible to shut down a vessel to drill and plug for direct caliper measurement. This sonic instrument has correlated well with caliper measurements. Some operators are now leaving openings through the insulation on their towers so that Audigage measurements can be readily made. These openings in the insulation are covered with aluminum caps. There are other sonic instruments which are adaptable to plant-inspection problems, and gamma-ray methods have also been used.

In the liquid-recovery sections of many gasoline plants, corrosion has been found predominantly in the bottom of vessels. In some other plants, however, corrosion has been most aggressive in the upper portions of bubble-cap towers where the temperature becomes low enough for water to condense. This type of attack has been reported in the stripping column in an Illinois gasoline plant. Treatment with a corrosion inhibitor is now being made in this plant, and the inhibitor effectiveness is checked at regular intervals by an iron analysis made on the water which is drawn off the top trays.

Heat exchangers . . . Corrosion of heat-transfer surfaces has also occurred in several plants recovering liquid products. The economical choice of heat-exchanger tubing will vary considerably from plant to plant, and will depend, among other things, on the quality of water available for cooling, on whether or not the products being cooled contain corrosive gases, and, to a very large extent, on the temperature and the temperature gradient through which heat is being exchanged.

At present, there is not sufficient information available to predict which metals will be serviceable in any particular plant. Even where the product analyses and operating conditions of two plants appear to be substantially the same, it is not always safe to predict that a metal which has been usable in one plant will be satisfactory in another.

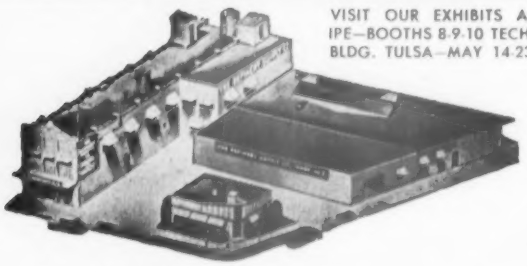
Water-side corrosion of heat-transfer equipment is so well known that it is often accepted as an irreducible operating expense. Cooling water must be treated so that mineral scales are not formed, algae and other forms of biofouling are prevented, and corrosion of steel, cast iron, and brasses are controlled. Delignification of cooling-tower lumber must be avoided. All of this must be done at a reasonable cost. It is, therefore, not too surprising that plant water treatment has either not been tried at all or else has been approached on a piecemeal, patchwork basis. In altogether too many plants, the cycle of acidizing for scale removal, neutralizing for corrosion control, periodically switching from one biopoison to another, and steadily replacing wood and metal deteriorated beyond repair is not rigorously adhered to.

In one plant pits ½ to ¾ in. deep in the cast-steel headers of condensers and solution coolers were found. Local galvanic cells had removed as much as ½ in. of steel where admiralty tubes were rolled into steel tube sheets and heat transfer was impeded by a heavy sludge of corrosion products in the water courses. This damage had occurred during 7 years' service—perhaps during the first few years when no water treatment was used, or perhaps during the entire period.

Product Storage

It is perhaps surprising to find corrosion in storage tanks holding propane and gasoline recovered from sweet gas. Although corrosion observed in most sweet-product storage tanks has not been rapid, the hazards and expense which corrosion can create here cannot be completely ignored. As in the liquid-recovery equipment, corrosion has been most severe in the bottom portions of the tanks where water has collected.

It is somewhat difficult to see how air could get into the storage tanks, and it is not believed that water by itself is very corrosive. Even normally



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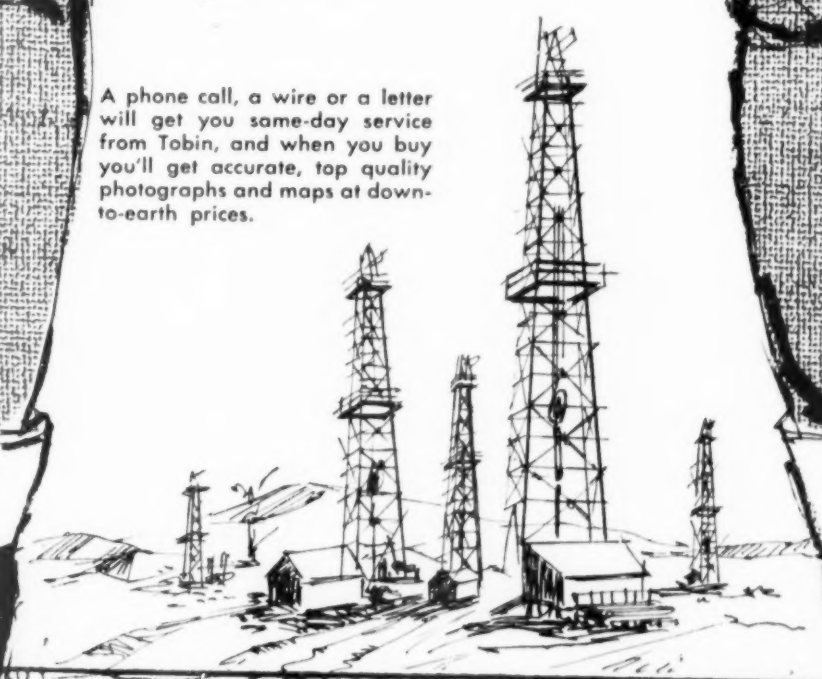

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sweet gas may contain small amounts of hydrogen sulfide, however, and if it were present we would expect it to concentrate in a plant's propane product. Few records are available to verify the presence of hydrogen sulfide in propane from sweet gas condensate because it is not normally expected or analyzed for.

In a recent inspection of some propane spheres in one plant, however, it was necessary to remove between 300 and 400 lb. of sediment from each sphere, which probably represented 50 to 75 lb. of steel. Since this was the first inspection in more than 5 years' operation, it is clear that the corrosion rate is not high, but the problem cannot be ignored particularly if the corrosion is localized. Caustic-wash facilities to dehydrate and also to remove hydrogen sulfide from propane are now in use in many plants, and this should alleviate the problem.

It is generally believed that similar corrosion is occurring in other tanks storing light products such as propane-butane mixtures, although to a considerably lesser extent due to lower incidence of hydrogen sulfide and water. Tanks holding distillate and heavier products, however, appear to be protected by the better wetting characteristics of these heavier hydrocarbons.

A Shell Photograph

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Gas-Sweetening Equipment

There are evidently quite a few plants recovering liquid products from sweet gas without any major corrosion problems. On the other hand, there are almost no plants which process sour gas where corrosion is not a source of continual expense. Indeed, in sour-gas plants corrosion has been experienced for so long and so generally that it is often not even recognized as such, but is looked on as a problem in supplying materials (e.g., heat-exchanger tubing) to keep the plant running.

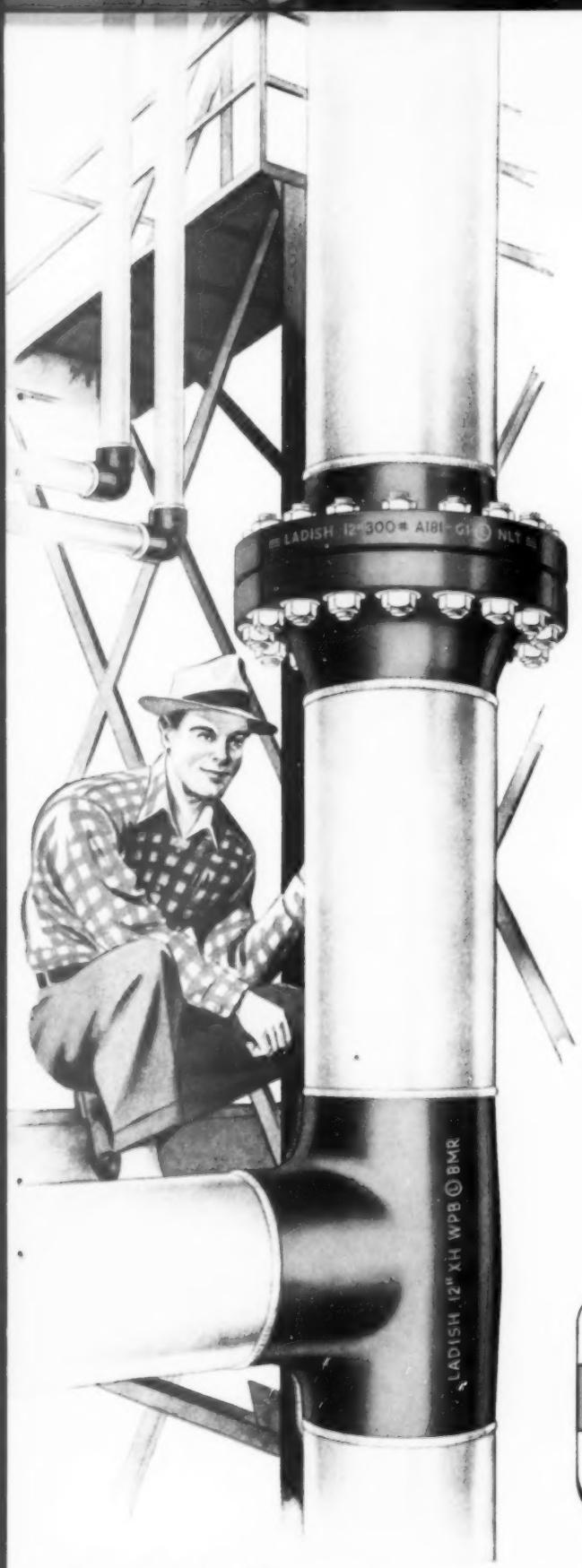
At this point, it should be emphasized that no criticism of the operators is intended for holding such a viewpoint. The most economical solution to this particular corrosion problem may actually be to replace the heat-transfer surfaces at intervals of 6 to 9 months using mild steel. Certainly a large amount of work has been done by individual operators, by the contractors who design and build the plants, and by metal suppliers in an effort to control corrosion in gas-sweetening plants. To a large extent, however, this work has been directed toward individual plants and even particular equipment in a given plant. Since corrosion appears to be almost universal in gas-sweetening operations, it appears more than desirable that an industry-wide effort be made to correlate experiences and to coordinate the attack on the problem in an effort to obtain a more economical solution.

Towers attacked . . . While heat-transfer surfaces are those most rapidly affected in gas-sweetening operations, corrosion is not confined to heat exchangers, reboilers and the like. Both absorption and stripping towers are attacked, and corrosion penetration rates on the order of 40 to 60 mils per year are quite common. In various plants, corrosion at these or even higher rates has been observed on the shell of the towers, on the tray and tray supports, on bubble caps and holddown bolts, and on the piping into and out of the towers. Bubble caps are not only attacked by corrosion, but in many cases are found to be plugged with corrosion products which the sweetening solution has picked up in other parts of the plant.

In some cases this particular problem has been so severe that plant-throughput capacity has decreased as much as 30 per cent within 4 months. Some operators have specified bubble caps with wider than normal slots in an effort to delay the plugging problem, while others have abandoned bubble caps entirely and used Raschig rings in their towers.

Product Loading Lines

It would be at least some comfort if



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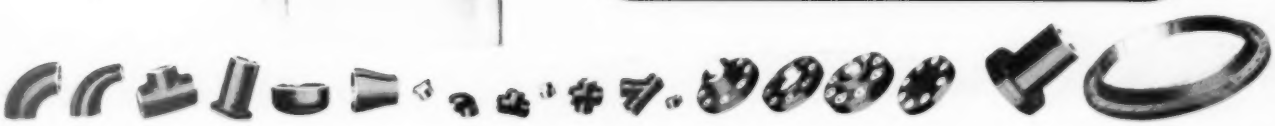

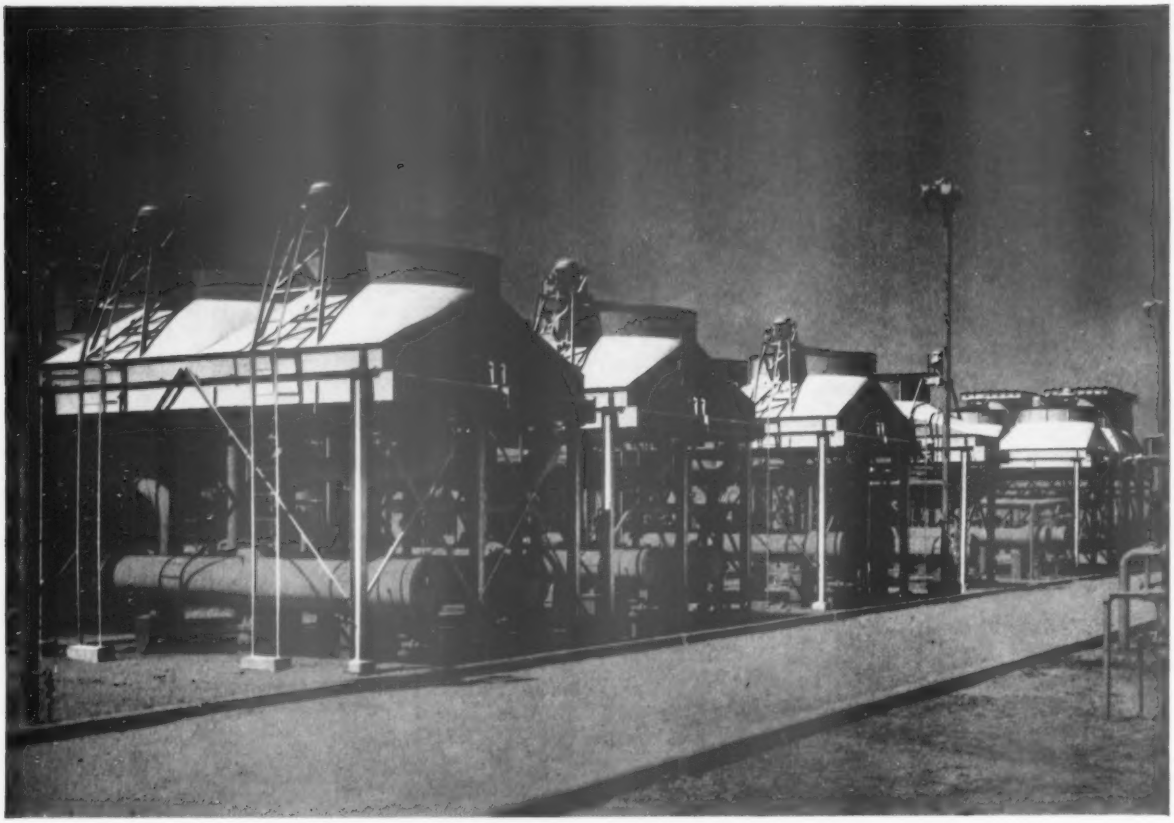

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the corrosion problem were over when the products left the processing areas. This, however, has not been the case. In one plant where gasoline is sweetened by Perco process and then piped to loading racks some 6 miles away, severe corrosion has been found in the product flow lines. In the Perco process, air is blown into the gasoline stream ahead of the sweetening process where water is formed as a reaction product in the treating bed. Some of this water dissolves in the gasoline and still more is entrained, carrying along with it some corrosive salts from the catalyst bed. As the sweetened gasoline goes down the line toward the loading racks, it cools off, and some of the water collects on the bottom of the line.

Since both the water and the gasoline are saturated with air from the sweetening reaction, the bottom of the loading line is subjected to attack in a completely conventional manner by a dilute aerated salt solution. In this case, the extent of corrosion is determined by the amount of air dissolved in the water and gasoline. Corrosion is quite severe near the plant and decreases downstream toward the loading racks where no attack at all is found.

This form of attack is, of course, not commonly expected, but it has been found that treatment with a water-soluble inhibitor is effective. It may be appropriate at this point to mention the patented use of sodium nitrite to inhibit corrosion in such products lines.

Although it seems quite likely that the strong aeration of the gasoline in the Perco treater is responsible for the corrosion in this loading line, similar corrosion would be expected in lines carrying sour gasoline or similar light products unless all traces of hydrogen sulfide were removed.

Summary—Water, and Acid Gases, and Air

By this time it may appear that all gas-handling equipment is corroding, or at least that corrosion has been found wherever it was looked for. This, of course, is not the case. In general, corrosion has been observed only where appreciable amounts of liquid water can be removed from the system. The severity of corrosion at these points is determined to a large extent by the amount of acid gases or the amount of air which is available.

We do not believe that we have a monopoly on corrosion in gasoline plants and their auxiliary facilities. Those of you who are now unfamiliar with corrosion in gasoline plants may find these experiences helpful to you in separating corrosion expenses which can be lowered from other plant maintenance costs, for we are well convinced that corrosion costs are generally reducible if proper attention is given to them.

Industry cooperation . . . The excellent work which has been done by the N.G.A.A. condensate - well committee has demonstrated that the high cost and hazards of corrosion can be quickly brought under control by an industry-wide cooperative study of the problems. We are convinced that the solution of such problems is obtained much more quickly through cooperative efforts than any one individual operator could obtain by himself. We are also convinced that any one operator's expenditure of money and manpower toward the solution of such problems on a cooperative basis is much smaller than would be needed if he were attempting to solve the problems by himself.

Acknowledgments

The writer wishes to acknowledge that the data presented here were mainly obtained from studies made by B. W. Bradley of Shell's Tulsa office.

Author with Shell Oil Co. Presented at the thirty-second annual convention N.G.A.A., Rice Hotel, Houston, April 29-May 1, 1953.

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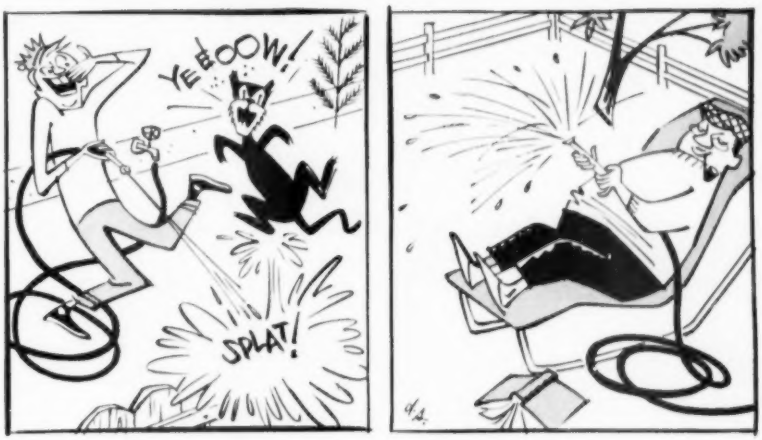

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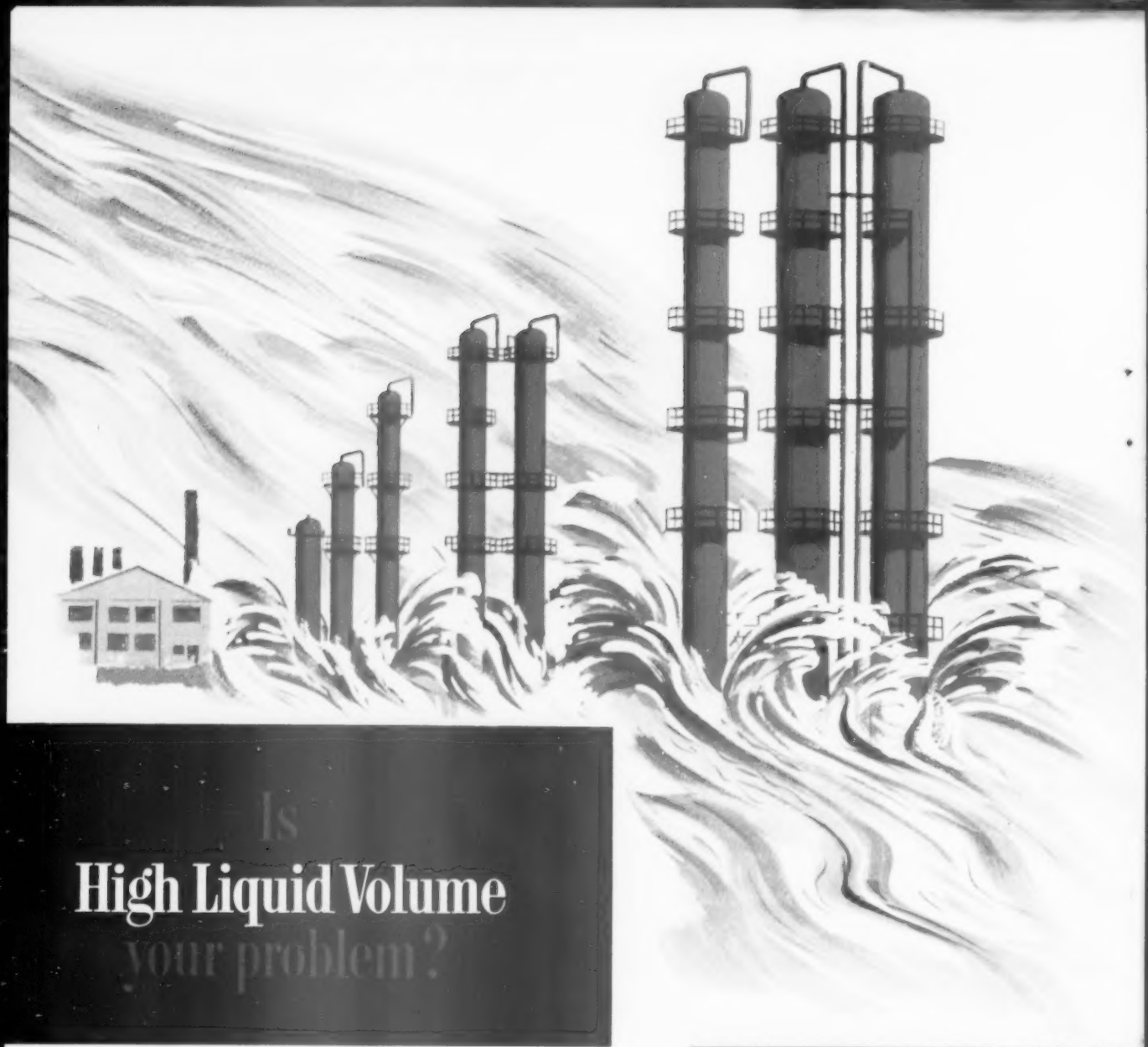

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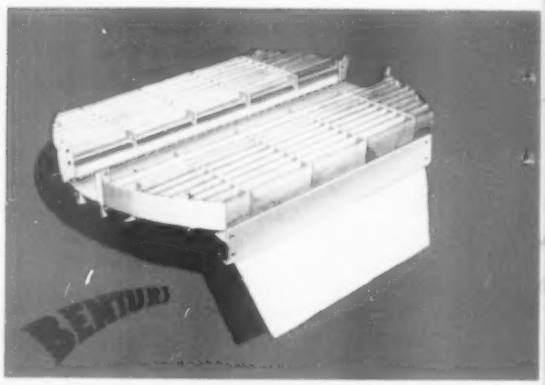

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TAPPING MACHINE at left has completed cutting a 10-in. tap in the buried main line and the riser at right is being lowered into the caisson to be connected to the upper flange of the gate valve.

Making a Hot Tap at 850 Psi.

. . . under 7 ft. of canal water

by Joseph A. Kornfeld
District Editor

A "HOT TAP" made at 850 psi. in a 30-in. natural-gas transmission pipe line buried under 7 ft. of canal water in southern Louisiana is a feat recently accomplished by company crews of United Gas Pipe Line Co. The operation was conducted under the supervision of C. A. Stewart, pipe-line superintendent, and A. L. Bridges, crew foreman, for the New Orleans district of United Gas.

The 10-in. hot tap was made for one of two laterals (the other is an 8-in. line) which will deliver gas from Duck Lake field of St. Martin and St. Mary parishes to the Bayou Sale-Napoleonville main transmission line.

Procedure Analyzed

Special caisson . . . Since the main line lay in 7 ft. of water in a canal, United Gas found it necessary to employ a caisson for the operation. Originally the tank was 8 ft. in diameter and 12 ft. high; however, to provide more working room for welders and fitters, two ½-in. plate sections, each 4 by 12 ft. were added to form an elliptical-shaped tank.

What Is a Hot Tap?

A hot tap is a cutting operation conducted under line pressure so that a lateral can be joined with a transmission pipe line in such a manner that there is no interruption to pipe-line service. The term was borrowed from the electrical construction field.

To enable the caisson to be lowered over the 30-in. transmission pipe, slots 3 ft. wide and 5 ft. high, were cut into each of the two flat sides of the tank. In this manner the caisson would not only straddle the big-inch pipe but would come to rest below it in the canal bed itself.

United Gas hauled in the caisson through the canal on a crane-mounted barge. The barge was equipped to handle hoisting of the caisson, pipe-line valves, tapping machine, and laterals needed in carrying out this unusual submarine operation.

Step 1.—Placing of caisson . . . The slotted caisson, shown in Fig. 1, was lowered by the crane over the course of the main line at the lateral junction point. To facilitate the job, a diver was employed to guide the tank as it was lowered and to assure that the caisson evenly straddled the line. The use of a diver proved indispensable in placing of sandbags, both on the outside and the inside of the caisson, to afford a practical water seal for evacuating the caisson. Water was then pumped out of the caisson.

Step 2.—Nipple and stub-flange welding . . . With the caisson now ready for entry, welders were lowered to start operations. A 10-in. pipe-line nipple and a 10-in. stub flange was lowered by crane and welded on saddle to the main line as shown in Fig. 2. The nipple was milled at the factory to fit the

SPECIALLY CONSTRUCTED CAISSON was slotted on two sides to permit placing over natural-gas pipe line in a canal. (Fig. 1).

INSIDE SANDBAGGED CAISSON, welders welded a 10-in. stub flange and welding saddle onto 30-in. transmission pipe line. (Fig. 2.)

30-in. pipe diameter of the main line. Bottom surface of the nipple was scarfed to the curvature of the pipe surface to insure a perfect fit and to make possible a perfect weld.

Step 3.—Gate-valve mounting . . . The next step was the mounting of the 10-in. 600-lb. gate valve on top of the stub flange. A Williamson-Hillco Model 600 tapping machine was lowered into the caisson. The entire cutter assembly and adapter flange were mounted on the machine. The cutter assembly is comprised of an upper cutter holder, an Insertooth cutter, and an Insertip Pilot, as shown in Fig. 3. The adapter flange is drilled on its upper surface to match the tapping machine flange whereas the lower surface is a companion to the valve flange. Flange bolt holes were aligned carefully to insure free rotation of the drill.

Gate valve was placed in open position and the cutters passed through the gate itself to impinge upon the outer surface of the 30-in. pipe. The main line was now ready to be cut.

Tapping Machine Explained

The tapping machine is essentially a long bar provided with means to advance, retract, and rotate it. This boring bar is equipped with a square-hole drive and retainer-rod mechanism at its outward end which serves dually to hold and drive the cutter. The boring bar is fitted with the proper gearing to provide constant rotation of the cutter and to make possible a positive forward speed of the cutter while cutting action is under way. This gearing also permits high-speed advancement and retraction of the boring bar and its cutter.

The machine is driven by a 3.7-hp. compressed-air motor which operates at 180 r.p.m., using an air supply of 100 cu. ft. per minute at 90 psi. Although designed for a maximum operating pressure of 1,000 psi., the tapping machine has been tested in the machine shop at pressures up to 2,000 psi.

Step 4.—Cutting of coupon disk . . . A 10-in. coupon disk was cut with the cutter section of the tapping machine. See Figs. 4 and 5. The coupon disk was recovered within the cutter assembly itself and retained by the spring-loaded balls in the pilot drill.

Upon completion of the tap, the feed clutch was disengaged, the feed crank rotated counterclockwise, and the boring bar (including cutter assembly and coupon), withdrawn completely. Then the gate valve was closed and the bleeder plug opened to release trapped pressure. Machine with adapter flange was then detached from gate valve and Insertip pilot removed from Insertooth cutter to recover coupon.

Step 5.—Riser installation . . . Subsequently, the crane picked up the specially designed riser with flanged double wing and lowered it into the caisson.

Step 6.—Removal of caisson . . . With the tapping operation completed and the riser mounted into vertical position, the caisson has served its purpose on their submarine operation and is ready for removal. Crews first removed sandbags from within the caisson. The diver again was lowered into the canal to remove sandbags previously placed on the outside of the caisson. Removal of the caisson is thus made easy.

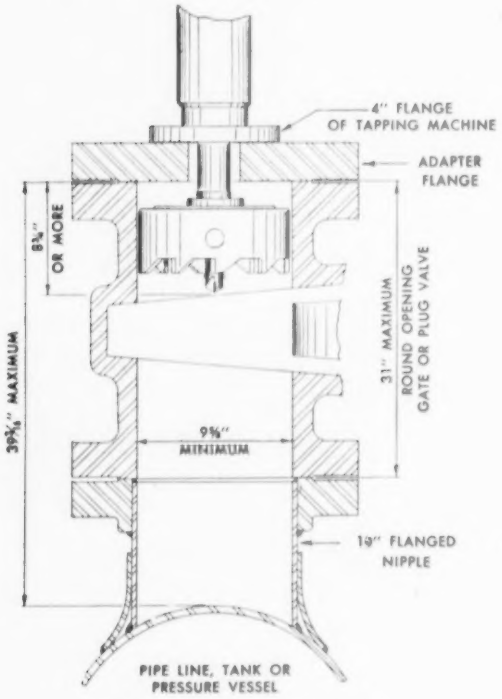
Step 7.—Cribbing the riser . . . A pen of piling was driven around the bare riser to protect it against possible damage by boats and barges using the canal.

Step 8.—Tying in to the riser . . . The next step was connection of the 10-in. field laterals to the flanged double wing on the riser.

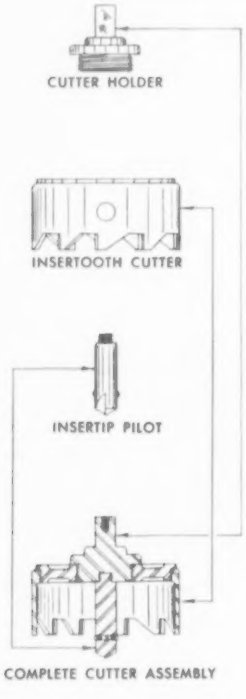
Step 9.—Cutting in gate valve . . . In the final step of this pipe-line operation, the diver opened the gate valve mounted on the main line.

I. P. E. ISSUE NO. 2

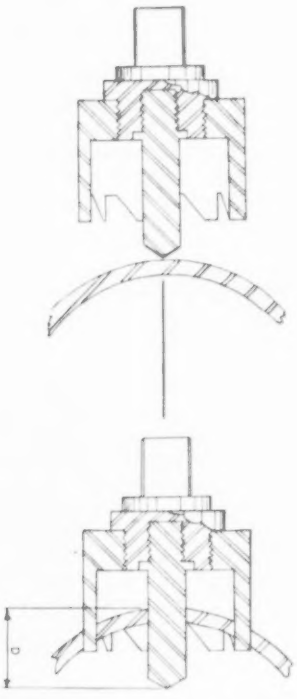
• *TRANSPORTATION*



TAPPING MACHINE with adapter flange mounted on 10-in. gate valve, in retracted position. (Fig. 3.)



SPRING-LOADED BALLS mounted in pairs on Insertip pilot enable retention of coupon disk after tap is made. (Fig. 4.)



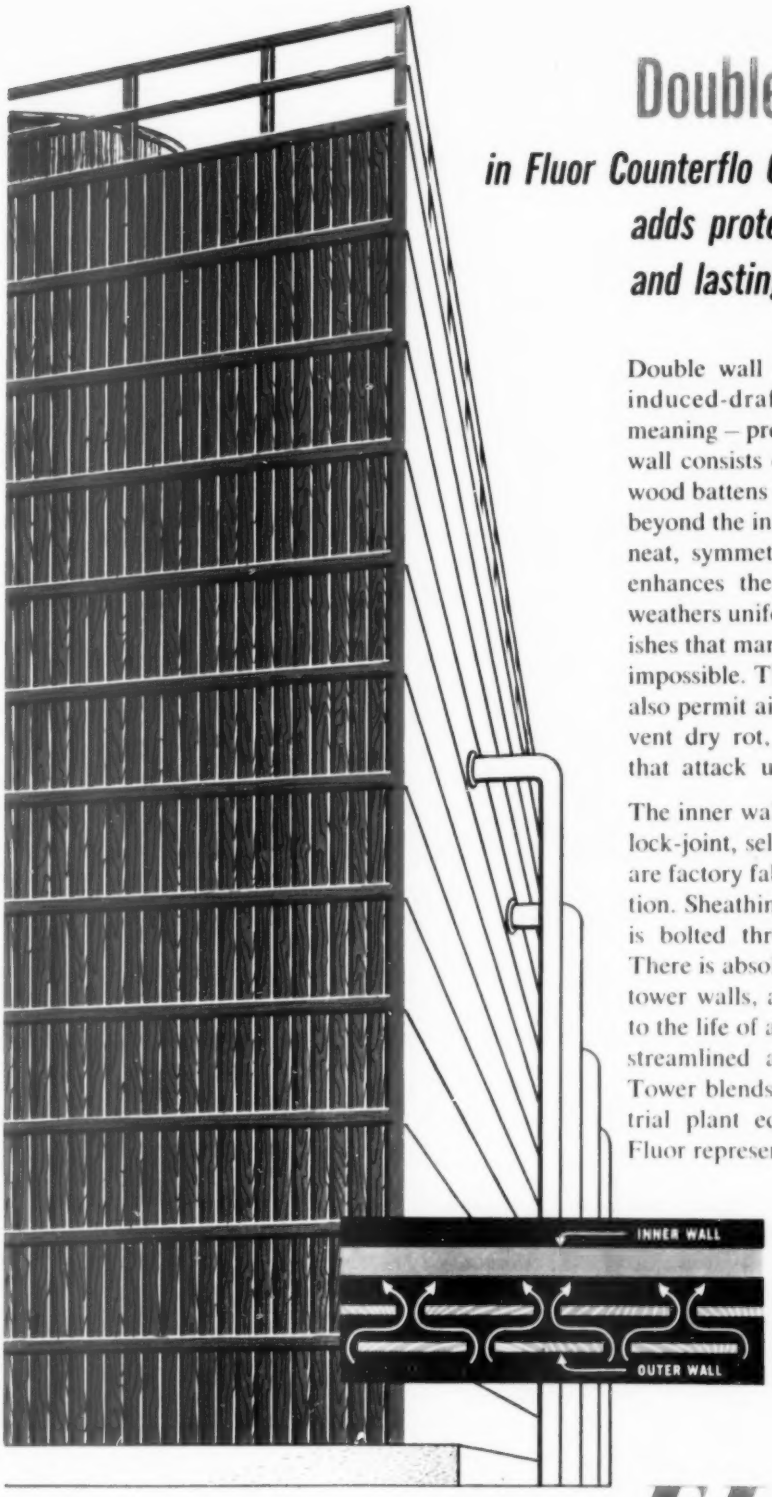
HOW CUT IS MADE is analyzed in the positions of the cutter assembly before the cut (above) and after the cut (below). (Fig. 5.)

Double wall sheathing

in Fluor Counterflo Cooling Towers adds protection and lasting good looks

Double wall construction provided on Fluor induced-draft cooling towers has a double meaning – protection and beauty. The outer wall consists of a double row of vertical Redwood battens which are located four inches out beyond the inner wall. This protective casing is neat, symmetrical, eye appealing and greatly enhances the beauty of a cooling tower. It weathers uniformly. Unsightly stains and blemishes that mar a cooling tower's appearance are impossible. The equally spaced rows of battens also permit air circulation around walls to prevent dry rot, algae growth and other blights that attack unventilated cooling tower walls.

The inner wall is constructed from 1 x 6 full Z lock-joint, select "heart" Redwood. Both walls are factory fabricated into panels for easy erection. Sheathing is not nailed to outer posts but is bolted through the main tower columns. There is absolutely no structural load borne by tower walls, another factor which adds length to the life of a Fluor Cooling Tower. The neat, streamlined appearance of a Fluor Cooling Tower blends well with today's modern industrial plant equipment. Contact your nearest Fluor representative, or write for details



Top view of double wall. The uniform spacing of vertical battens is not for the sake of appearance alone. Air is permitted to circulate between the aerators to prevent dry rot and living organisms from attacking tower walls.

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Process area of Elk City plant, operated by Shell Oil Co. Crude oil-stabilizer is at right, deethanizing absorber and still in center, depropanizer and debutanizer at left.

PROGRESS REPORT

Pressure Maintenance, Liquids Extraction, and Crude Stabilization

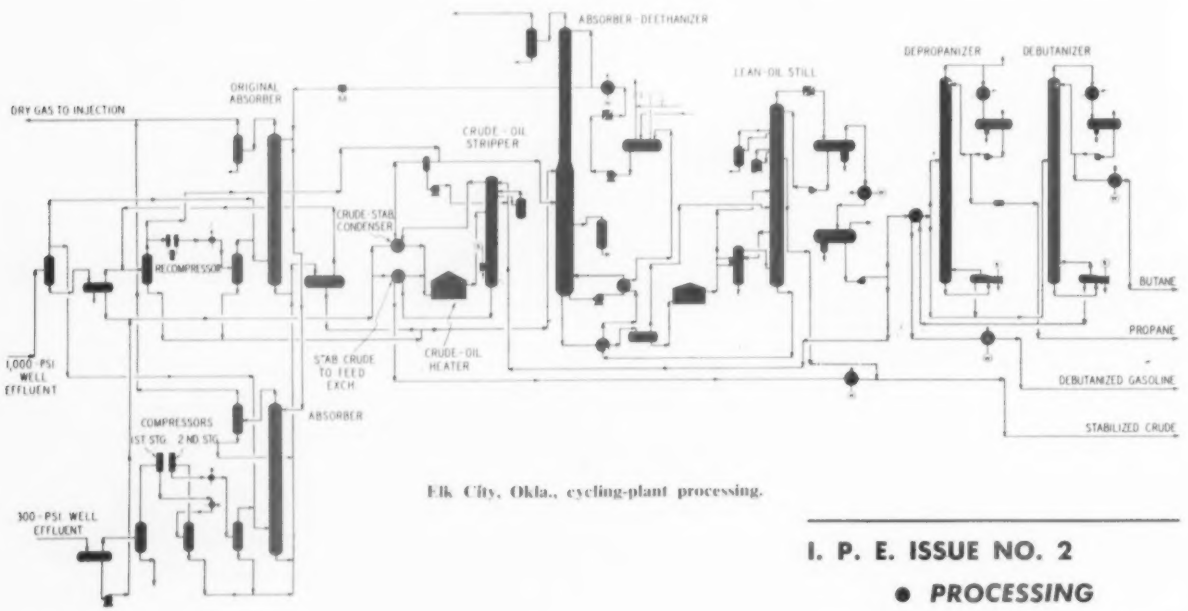
. . . at Elk City, Okla., Plant

Multipurpose field plant has second expansion now in the engineering stage. Process capacity will be upped to 220,000 M.c.f. upon completion of this new program

THE Elk City, Okla., cycling plant, operated by Shell Oil Co., went on stream in February 1951. It was at that time designed to process 100,000 M.c.f. of gas daily and to inject into the producing Hoxbar conglomerate reservoir some 75,000 M.c.f. per day. The plant was originally designed to make 215,000 gal. of natural gasoline and butane and 75,000 gal. of propane daily.

The Elk City plant was set up as a multipurpose field plant, combining the functions of crude stabilization, liquids extraction, and pressure maintenance.

In addition to Shell, owners of the plant are Continental Oil Co., J. M.



Elk City, Okla., cycling-plant processing.

I. P. E. ISSUE NO. 2

• *PROCESSING*

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CORE LAB

PETROLEUM RESERVOIR ENGINEERING

Absorber at left is one of two operating at 900 psi.

Injection line loops, leaving plant.

Huber Corp., Superior Oil Co. of California, Tide Water Associated Oil Co., Union Producing Co., United Carbon Co., Inc., Wilcox Oil Co., and others.

Plant Expansion

First extension . . . In June 1952 an expansion was completed raising the gas-processing capacity to 150,000 M.c.f. After making allowance for gas volume shrinkage due to liquids extraction and for gas used as plant fuel, the design injection capacity was raised to 135,000 M.c.f. New process facilities added in the first extension of the plant included a 50,000-M.c.f. absorber. The original compressor capacity, consisting of seven 1,350-hp. units or a total of 9,450 hp., was supplemented by an additional 8,800 hp. Daily design plant production was raised to 225,000 gal. of natural gasoline and butane and 100,000 gal. of propane. Fluor Corp., Ltd., was engineering contractor on the first extension.

A second plant extension, now in the engineering stage, will increase process capacity to 220,000 M.c.f.

Elk City Processing

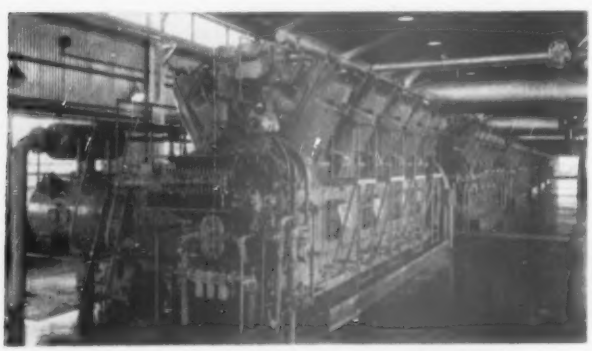
Plant equipment at present includes two absorbers, a deethanizing absorber, and a lean-oil still. Fractionation facilities include a depropanizer and debutanizer. A stripper column is employed to stabilize crude oil. A portion of the crude stripper bottoms goes to an absorption-oil stripper to provide absorption-oil makeup.

Absorption . . . High-pressure well effluent at 1,000 psi. undergoes a two-stage separation at 925 psi. and at 285 psi. The vapors from the 925-psi. flash go directly to the absorbers, while the overhead from the 285-psi. separation goes to the recompressor and is raised in pressure to 900 psi., joining the first-stage vapor stream to the absorber.

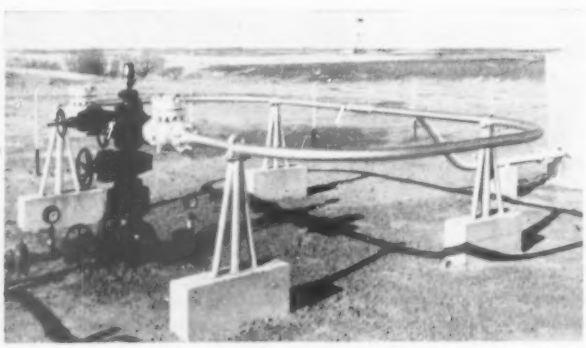
Low-pressure field-separator gas is compressed in two stages to 900 psi., before going to the absorbers which are operated in parallel. Both absorbers operate at 900 psi. and a temperature in the neighborhood of 90° F. Residue gas from each absorber goes through a scrubber to the injection compressor intake lines.

Deethanizing absorber . . . This is a "milk bottle" design operating at an average pressure of about 150 psi. The vapor stripped from the crude oil in the crude-oil stabilizer is fed to the absorber deethanizer. A direct-fired heater with a design duty of 36,000,000 B.t.u. per hour heats the rich oil

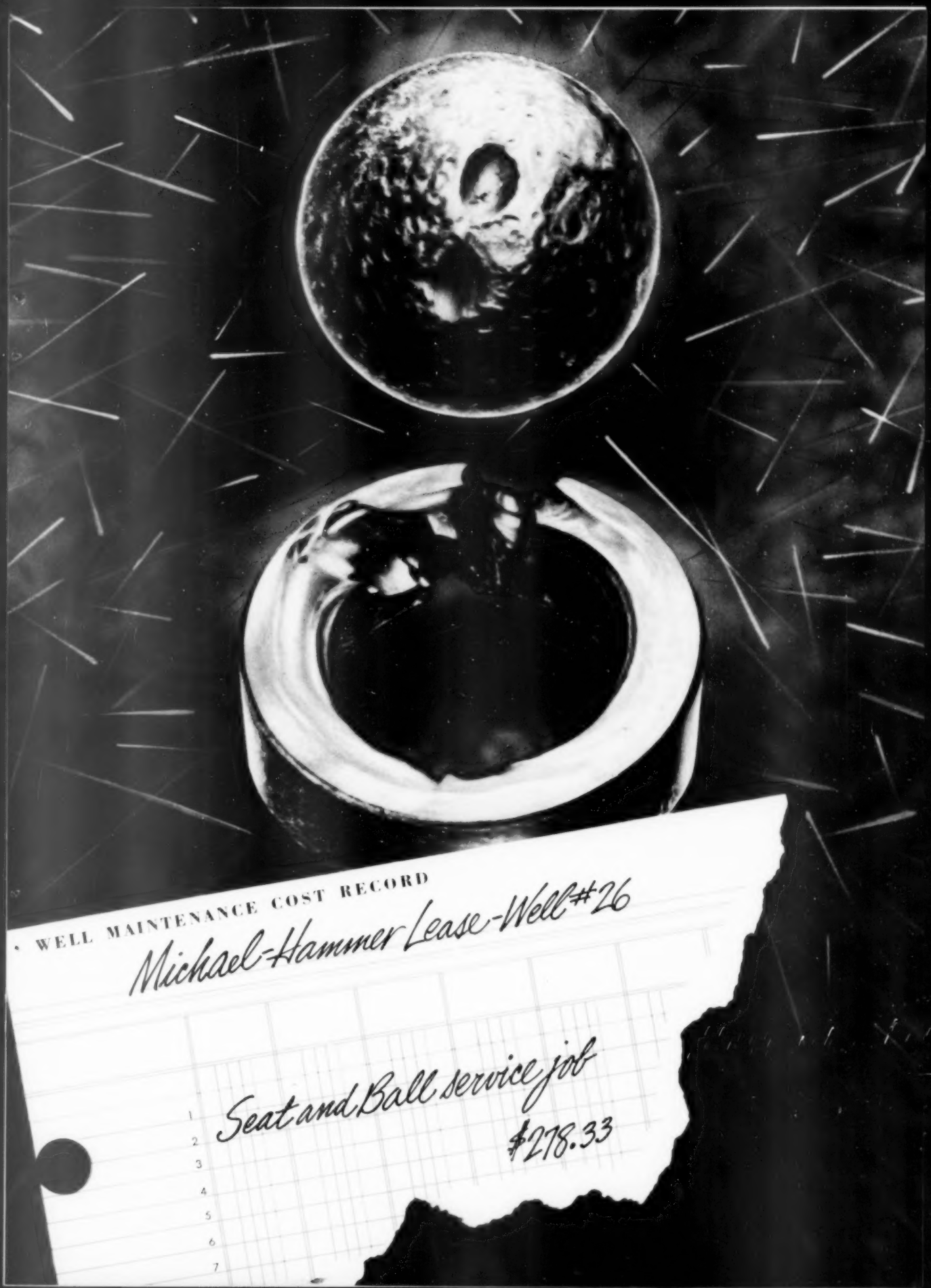
I. P. E. ISSUE NO. 2
• *PROCESSING*



Present compressor capacity totals 18,200 hp.



One of injection wells in pressure maintenance program.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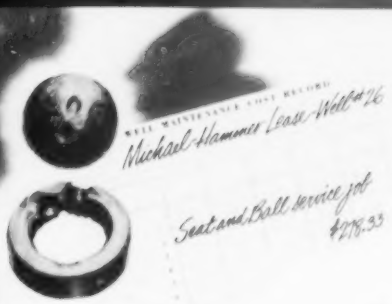

...This ball and seat service job could have been prevented – with an

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from the base of the deethanizing absorber before it enters the still. Steam is employed to accomplish stripping of rich oil in the still.

The residue gas from the deethanizing absorber is used for plant fuel and to operate drilling rigs in the field. Lean oil from the still exchanges heat with net bottoms product from the deethanizing absorber and also provides reboil heat for this column.

Material Analyses

Typical material analyses for the Elk City plant in current operation follow:

1. Feed streams
   (a) 1,000-psi. well effluent:

Component	Gas (mol per cent)
CO_2	0.20
N_2	0.98
C_1	86.67
C_2	5.80
C_3	3.83
i-C_4	0.53
C_4	1.06
i-C_5	0.31
C_5	0.28
C_6	0.21
225° F.	0.13
Total	100.00

   (b) Low-pressure well-separator gas:

Component	Gas (mol per cent)
CO_2	0.20
C_1	85.54
C_2	6.74
C_3	4.10
i-C_4	1.05
C_4	1.42
i-C_5	0.38
C_5	0.25
C_6	0.29
225° F.	0.13
Total	100.93

2. Plant products
   (a) Depropanized gasoline:

Component	L.V. per cent
C_2	
C_3	
i-C_4	11.47
n-C_4	39.36
i-C_5	14.28
n-C_5	13.97
C_6+	20.92

   (b) Vapor pressure, 13.5 psi.:

Component	L.V. per cent
C_2	0.10
C_3	1.57
i-C_4	1.27
C_4	4.10
i-C_5	3.31
C_5	4.76
C_6	15.87
225° F.	14.33
400° F.	31.38
500° F.	9.48
Res.	13.83
Total	100.00

Crude stabilization . . . Liquid from the 285-psi. separation of the high-pressure well effluent is preheated by heat exchange, and further heated in direct-fired heater with a design capacity of 12,000,000 B.t.u. per hour before feeding to the crude-oil stripper. Stripping is aided both by open and closed steam, a steam coil being located in the bottom of the crude stabilizer while live steam is introduced below the bottom plate.

Stripped vapors coming off overhead are cooled by heat exchange with liquid feed and go to the deethanizing absorber. Stabilized crude oil also furnishes heat for incoming liquid feed, then goes through coolers to storage. Design is for production of a stabilized material of 13.5-psi. vapor pressure.

A small stream in the order of 5-6 g.p.m. of stabilized crude oil is employed to furnish absorption-oil make-up. A 2-ft.-diameter absorption-oil stripper is provided to remove volatile components from the stabilized crude. Stabilized crude oil from the bottom of the stabilizer is fed to the top of the absorption-oil stripper. Overhe d vapors from the absorption-oil stripper go to the still.

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NEW-TYPE CYCLONES were added to the units to enable use of higher velocity flow rates. One cyclone is here being hoisted to the elevated vessel for assembly.

EROSIVE ACTION knifed away these cyclones, resulting in the incorporation of the new-type cyclones into the unit. The new cyclones are designed to resist erosion.

BREAKING BOTTLENECK

Revamped Cyclone System Features Humble's Cat Cracker Expansion

Other modernization moves included installation of a new furnace and large centrifugal gas compressor, and rearrangement of heat exchangers and enlargement and modification of flow and air lines.

by F. Lawrence Resen
Gulf Coast District Editor

A SERIES of alterations and modifications to Fluid catalytic cracking unit No. 1 at Humble Oil & Refining Co.'s Baytown, Tex., refinery has seen its capacity more than quadrupled since it first went on stream in November 1942.

The cat cracker, which started its initial run with a design capacity of 13,380 bbl. per stream day, has had its capacity increased within a decade to 55,000 bbl. per stream day.

Some of the more recent changes have involved the complete revamping of the cyclone system in the spent catalyst and regenerated catalyst vessels and the fabrication of new housings for both of these vessels.

Spent Catalyst Stripper

Inspection of the spent catalyst stripper (D-7) and primary cyclone (D-7A) vessels had revealed that the metal had deteriorated to a point where replacement of the equipment was required. It was felt that during the down-time period which would be necessary it would be feasible to also replace the secondary and tertiary cyclones (D-8 and D-9). The additional investment to replace the four vessels simultaneously was relatively small compared to the debit which would be incurred in a subsequent down-time period should it become necessary later to replace the secondary and tertiary cyclones.

Single vessel . . . After studies were made involving several possible means of attacking the problem, the installation of a large single vessel was found to be more attractive rather than replacing the four vessels with larger units of similar design. The single-vessel design required a lower investment, shorter down time, and eliminated the intermediate external piping, valves, and expansion joints required for the separate vessels. In addition, the new vessel provides an improved catalyst-recovery system and permits

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Briefly, the Security Neo-Red Rubber Stabilizer consists of a 6-foot integral forged steel mandrel with an 18-inch rubber sleeve mounted on the recessed portion of the mandrel. The circular sleeve consists of an oil and temperature resistant rubber moulded over two forged-steel half sections. The metal portion of the sleeve fits inside the recessed portion of the mandrel, with only the rubber extending past the O. D. of the mandrel.

The rubber sleeve floats on the mandrel, providing a wide surface contact to the hole wall, thereby resisting any lateral movement of the drill collars. Stabilizer is easily mounted in drill-string and sleeve can be changed in a matter of minutes right at the rig by only one man. No welding or special tools are required to change sleeves.

Write for Bulletin 130

A multi-colored 4-page bulletin describing the new Neo-Red Rubber Stabilizer in full detail is available upon request. Send for your copy today.

Look at these Field-Proven Features . . .

1 FLUTED CHANNELS

Channels on interior of sleeve permit cuttings to circulate without being hung-up. Scalloped channels on cylindrical exterior insure full circulation, prevent mud and cuttings from lodging between sleeve and formation. Sleeve floats on mandrel, performs no cutting action.

2 FAST CHANGE OVER TIME

Each of the two lightweight sleeve sections has metal tongue and groove to facilitate ease in mounting and removing sleeve right at the rig. Sections are securely joined by seven studs on each side.

3 SOLID ONE PIECE MANDREL

Cut from solid steel forging for maximum strength and safety, this 6-foot mandrel has recessed area for mounting rubber sleeve firmly in position.

Designed to operate in the open hole, this revolutionary new Security Neo-Red Rubber Stabilizer assures you of maximum drilling efficiency and provides a safety margin heretofore unobtainable in steel stabilizers.

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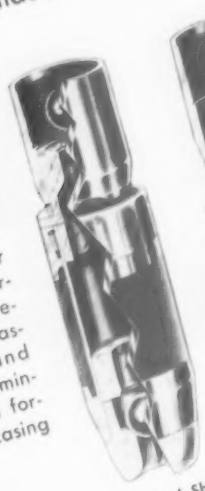
Cementrol Equipment was originated by Larkin for the purpose of protecting exposed low-pressure, permeable formations against contamination by cement. Thousands of successful applications have made it standard equipment for such service.

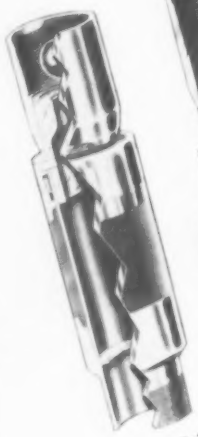
CEMENTROL SHOE

Provides an annular packoff and an internal bridge that prevent downward passage of slurry and subsequent contamination of exposed formation below casing seat.



Cementrol Shoe Running-in Position

Cementrol Shoe in Pack-Off Position



Cementrol Collar Running-in Position

Cementrol Collar in Pack-Off Position

CEMENTROL COLLAR

Operates just as Cementrol Shoe to direct slurry upwardly above perforated liners, formation crevices or other zones of lost circulation located at any point above casing seat.

FLAPPER TYPE FLOAT COLLAR

Cementrol Equipment is hydraulically actuated by pump pressure. The Flapper Type Collar allows passage of bridging ball used in this operation.

Flapper-type Collar Floating-in Position

Flapper-type Collar Pumping Through

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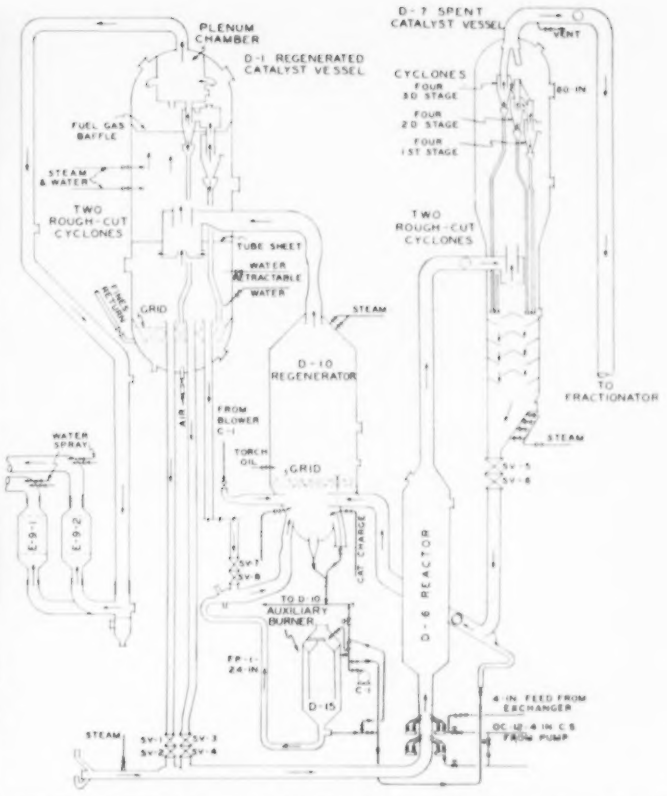
SCALE-MODEL CYCLONE was used to study methods of arrangement for ease of assembly and to simplify future maintenance work.



REVISED SYSTEM for catalyst handling in Humble's Baytown refinery. Spent-catalyst vessel is at upper right.

increased flexibility of operations with a potential increase in regeneration capacity.

The new spent-catalyst vessel consists of two sections, the upper portion being the cyclone chamber and the lower being utilized as a spent-catalyst stripper. Four three-stage cyclones are located in the upper chamber which has a 20-ft. inside diameter, and a stage of rough-cut cyclones is located in the upper section of the stripper which has a 14-ft. inside diameter. Catalyst and vapors enter the upper section of the stripper and pass through the two rough-cut cyclones. Oil vapors then flow upward through the three-stage cyclones and pass overhead to the fractionator. Catalyst flows downward through a disk-and-doughnut stripping section and discharges into an existing spent-catalyst standpipe and is returned to the regenerator through the spent-catalyst line.

Shell design . . . In designing the vessel shell, the diameter of the cyclone section was established as the maximum permitted by the clearance in the existing structure. The diameter of the stripping section was then determined as that necessary to permit the use of a symmetrical transition cone between the stripper and the cyclone chamber, without making any alterations to the existing spent-catalyst piping. As design work proceeded it developed that it would be desirable to eliminate as many shell discontinuities as possible and so a reverse-curve middle transition section and a spherically dished bottom-cone transition section were incorporated.

The height of the cyclone section was determined by the physical dimensions of the cyclone clusters and required dip leg lengths. The height of the stripping section was set by the height of the rough-cut cyclones and by process design on the disk-and-doughnut baffles. In the cyclone chamber, 60-in. and 50-in.-diameter manholes were provided for removal of the cyclone outlet pipes, crossover connections, collection pots, and dip pipes.

Over-all height of the stripping vessel is approximately 110 ft., with the cyclone chamber, including hemispherical dome and transition section, being approximately 52 ft. high and the stripping section 58 ft. A gas design pressure of 45 psig. was specified in order to permit possible future operation of the reactor at 35 psig. Allowing for a 10-psig. static catalyst head in the bottom cone the final design conditions were 55 psig. from bottom of the vessel to the center transition cone and 45 psig. from the bottom of the transition cone through the top of the vessel. Internal design temperature was taken as 980° F.

Catalyst stripper . . . The new spent-catalyst stripper is of the same design as the old external stripper and contains four sets of disk-and-doughnut baffles. At a catalyst rate of 35 tons per minute the loading in the stripper, based on a superficial cross-sectional area of 140 sq. ft., will be 500 lb. per minute per square foot.

The slope of the baffles is 30° from horizontal and effective diameters of the disks and doughnuts is 8 ft. The stripping steam is injected into the bottom cone of the vessel through a total of forty 2-in. supply lines located at several levels in the cone to provide adequate distribution in the vessel.

Cyclone stages . . . The catalyst-recovery equipment consists of a stage of rough-cut cyclones located above the baffles in the stripping section of the

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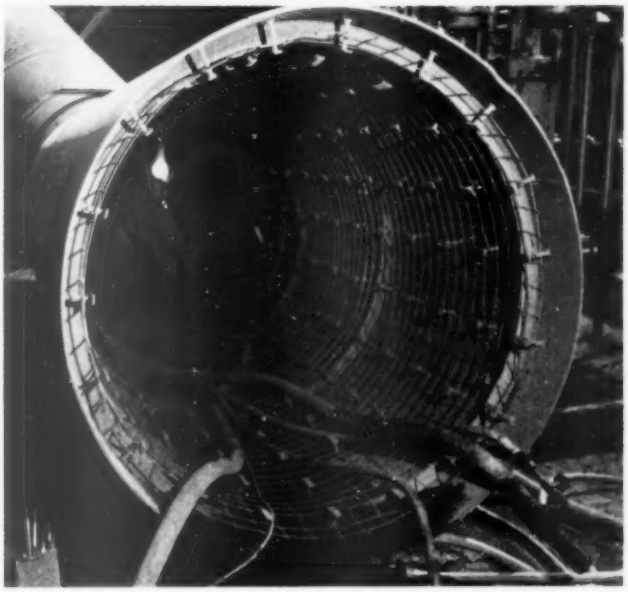
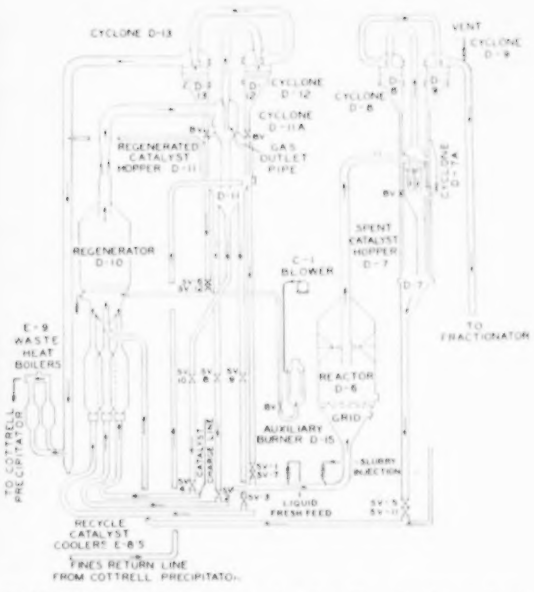


CATALYST FLOW LINE is being internally coated to provide protection from erosion due to catalyst flow.



ORIGINAL SYSTEM for catalyst handling is shown here, before revisions were made.

vessel and three stages of cyclones installed in the enlarged upper cyclone chamber. Two 6-ft.-diameter rough-cut cyclones in parallel designed for an inlet velocity of 50 ft. per second constitute the first stage. Each subsequent stage consists of four cyclones in parallel; the inlet velocity in these cyclones is 60 ft. per second.

The dip pipes from the cyclones extend through the tube sheet between the upper and lower sections of the vessel into seal pots located immediately above the top disk in the stripper. An 8-in. drain pipe from the tube sheet will also be extended into a seal pot located above the top disk.

Unusual problems . . . Design of the spent-catalyst vessel internals presented several unusual problems. Differential expansion between the shell and the internals was a consideration in almost every case. One of the jobs most difficult to visualize was the arrangement of the 12 cyclones, arranged in four parallel three-stage runs, in the cyclone chamber. In order to assist in and speed up design work, a scale model was made of the cyclones and vessels using wood for the cyclone parts and plexiglas for the vessel shell.

A scale of ½ in. to 1 ft. was used, and one cluster of the model cyclones was made in detachable sections corresponding to the flanged sections of the full-size cyclones. The model proved to be very useful and prompted several revisions which will result in more efficient handling and maintenance. One such revision was the arrangement of the cyclone supporting straps in two concentric circles with a circular monorail provided in between for handling of cyclone parts.

This study also indicated that with a slight relocation of the 60-in. manhole it would be possible to remove cyclone parts from the vessel without providing removable support straps on one of the cyclones as was originally planned.

Tube sheet assembly . . . One of the most interesting problems encountered in designing the internals was the rough-cut cyclone and tube-sheet assembly. The two rough cuts were welded to form a truss and the entire assembly was supported on two diametrically opposed lugs. The rough-cut inlet nozzle was welded to the vessel nozzle and horizontal differential expansion of the shell-and-cyclone assembly was provided for with sliding support lugs. The tube sheet is also provided with a sliding seal around its periphery. Slip joints were used for each of the five cyclone dip legs to accommodate the 2½-in. vertical differential expansion between these internals and the vessel shell.

Due to the fact that plate thicknesses were relatively thin it was possible to make subassemblies on the ground for erection into the structure. As examples of this the bottom cone and center transition section were completely welded and radiographed prior to erection. The 20-ft. cylindrical section was made up in approximately 8-ft.-high rings in the same manner. The entire vessel was radiographed and subjected to a pneumatic test of 84 psig.

Regenerated-Catalyst Vessel

An interesting development was encountered in the fabrication of the shell of the regenerated-catalyst vessel. Its replacement came at a time when steel was in short supply, and to speed up operations, hot-oil accumulator drums from an old pipe-still unit were torn down and used in the construction of the shell.

In designing the regenerated-catalyst vessel, a similar technique was followed as in the case of the catalyst stripper in that the cyclones were placed within the vessel whereas previously they had been separate components of the system.

Cyclone chamber . . . The top section of the new vessel comprises the cyclone chamber with the lower section serving as a regenerated catalyst hopper and second-stage regenerator. The elevation of the bottom of the vessel was established so that, with the anticipated normal catalyst holdup, sufficient head above the regenerated catalyst standpipes is maintained to permit satisfactory operations at the 55,000-bbl. per day fresh-feed rate.

The vessel was positioned in the structure so that relocation of the regenerator outlet line, regenerated catalyst standpipes, and the flue-gas line was not necessary. The shell is a 20-ft. o.d. by 56½-ft. straight section with hemispherical top and bottom heads.

Net inside diameter of the vessel, allowing for interior coating, is 19 ft. 2½ in.

Design data . . . Design conditions specified for the new vessel are pressures of 13 and 18 psig., at the top and bottom of the straight section, respectively, and a temperature of 1,200° F. Maximum normal catalyst load is 100 tons with emergency conditions, used in checking the structure and foundations, as follows:

	Tons
Regenerated catalyst hopper	275
Regenerated catalyst standpipes	25
Total inventory in unit	350

Blower air is injected into the bottom of the vessel through a 16-in. air line, and a grid is located 1 ft. 8 in. below the bottom knuckle. The height of the hopper section, from the grid to the bottom of the rough-cut cyclone, is 24½ ft.

The regenerated catalyst is withdrawn from the bottom of the vessel through two 26-in. feed standpipes and one 26-in. bypass standpipe. Catalyst will flow into the standpipes through funnels 48 in. i.d. at the top and 38¾ in. long extending 27 in. above the grid. Each funnel contains a 24 by 6-in. slot to facilitate the removal of catalyst during shutdown.

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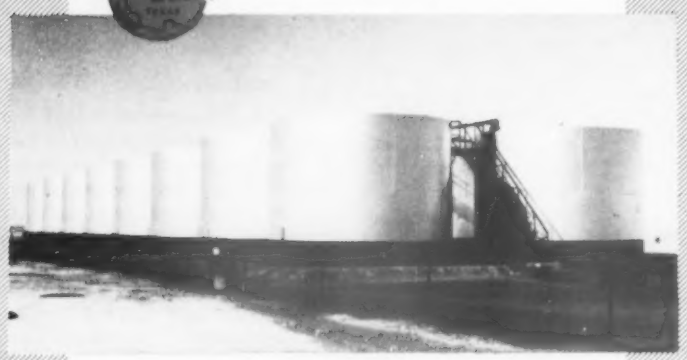

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Catalyst-recovery equipment in the new vessel consists of a stage of rough-cut cyclones plus two stages of cyclones for removing fines. Two stages of cyclones previously installed immediately upstream of electric precipitators were left intact in the modification.

Internal cyclones . . . Recovery of catalyst inside the vessel was preferred both from the standpoint of maximum heat utilization and the maintenance of a more uniform catalyst particle size distribution; hence, the installation of three stages of cyclones in the vessel is desirable even though inlet velocities are higher than recommended design figures.

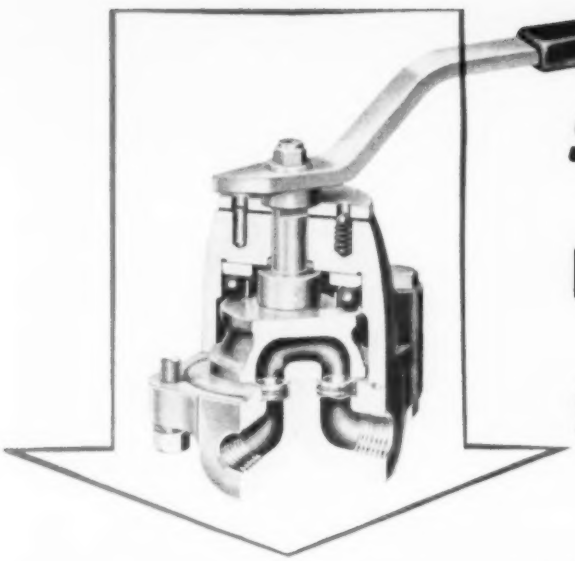
The first stage is composed of two 8-ft.-diameter rough-cut cyclones in parallel with design inlet velocity of 58 ft. per second. The second stage contains four cyclones from the original cyclone chamber (D-12) and four from the original cyclone chamber (D-13) which are in parallel. Each set of the cyclones discharges into a common duct which is connected to four of the cyclones removed from the spent-catalyst vessel and constitute the third stage.

Tube sheet . . . A tube sheet is installed around the rough-cut cyclones to separate the hopper and cyclone sections of the vessel. A 6-in. drain pipe extending into the catalyst bed has been provided to accommodate catalyst which will settle out onto the tube sheet. A loose fit between the tube sheet and the cyclone dip pipes permits a portion of the gas from the lower section to pass through the tube sheet. In addition, fourteen 1¼-in. holes have been punched in the tube sheet to afford aeration of the catalyst in the vicinity of the drain inlet.

To prevent a partial bypassing of the rough-cut cyclones by the gases from the regenerator, the open area of the tube sheet is such that only 50 per cent of the gas from the hopper will flow through the openings when there is no bed of catalyst above the tube sheet.

A baffle is installed just above the second-stage cyclones to minimize the flow of flue gas into the dead space above the cyclone inlets. Steam injected into the top of the vessel through four 3-in. nozzles purges the space above the baffle and prevents afterburning in this section. The baffle is attached to the cyclones but is not sealed to the wall of the vessel and the purge steam is able to flow down around the outer edge of the baffle.

Water spray . . . To prevent excessive rise in temperature when catalyst cir-



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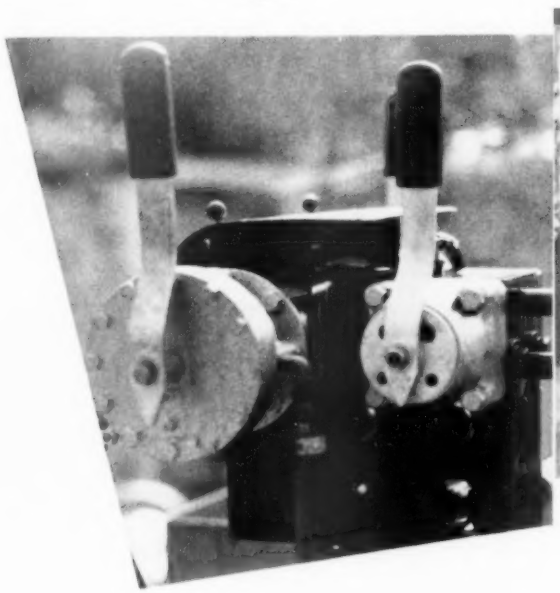

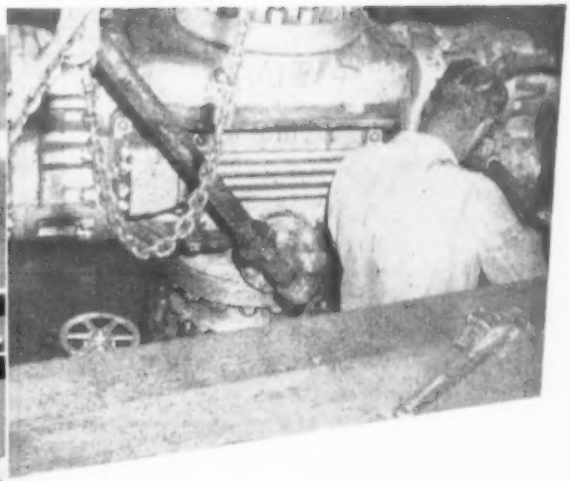

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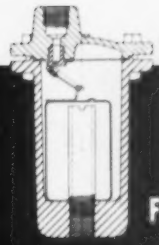

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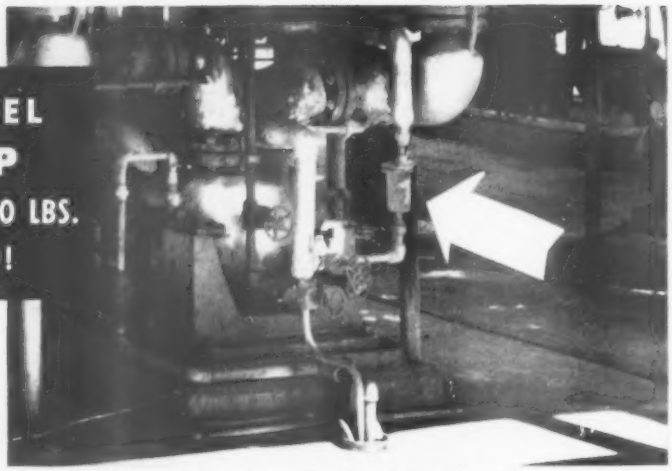

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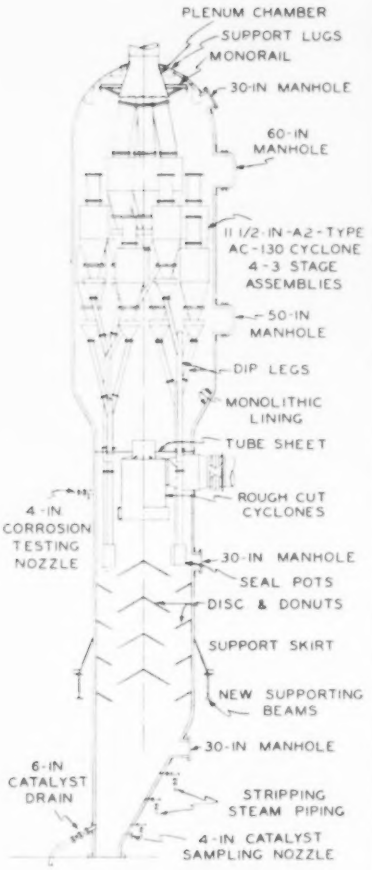

CROSS-SECTION of spent catalyst vessel.

culation is interrupted and to control severe cases of afterburning, dense-phase and dilute-phase water sprays having capacities of 115 and 150 g.p.m., respectively, are installed. The hopper section of the vessel contains two 1-in. pipes, flattened to ⅛ in. at the end, serving as dense-phase sprays and two retractable 1-in. foghead sprays, having a combined capacity of 30 g.p.m. in the dilute phase.

Two stages of six retractable sprayers are situated in the cyclone section at approximately 5 ft. and 10 ft. above the rough-cut cyclone gas outlet.

Other bottlenecks were removed in the unit and a new furnace, additional pumps, and a large centrifugal gas compressor were installed. Rearrangement of heat exchangers and enlargement and modification of flow and air lines were also carried on as the unit's capacity was increased through the years to its present 55,000 bbl. daily.

Similar changes were made to the No. 2 cat cracker which had its capacity increased from 16,000 to 55,000 bbl. between 1944 and 1953. Total design capacity of the units gives the Baytown refinery a catalytic cracking capacity of 110,000 bbl. daily.

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Active Gas-Injection Projects in West Texas—

Company—	Name of pool	County	Date project started	Name of formation (depth, ft.)
Atlantic Refining Co.	Block 31	Crane	July 1949	Devonian (9,000)
			Oct. 1952	Devonian (9,000)
Gulf Oil Corp.	N. Ward-Estes	Ward	June 1940	Yates (2,784)
Helmerich-Payne, Inc.	White-Baker	Pecos	Aug. 1947	Queen (1,785)
Lion Oil Co.	Diamond "M"	Scurry	July 1952	Canyon (6,800)
Lone Star Production Co.	Kelley-Snyder	Scurry	July 1951	Canyon (6,800)
McCurdy	Clara Couch	Crockett	Mar. 1948	San Andres (2,080)
Sinclair Oil & Gas Co.	Midway Lane	Crockett	May 1949	Ellenburger (7,600)
Sinclair Oil & Gas Co.	Shafter Lake	Andrews	Dec. 1951	Devonian (9,900)
Stanolind Oil & Gas Co.	Anton Irish	Lamb & Hale	Jan. 1952	Clearfork (6,100)
Stanolind Oil & Gas Co.	Cedar Lake	Gaines	Apr. 1946	San Andres (4,789)
Stanolind Oil & Gas Co.	Midland Farms	Andrews	Jan. 1953	Grayburg (4,800)
Stanolind Oil & Gas Co.	Three Bar	Andrews	Nov. 1952	Devonian (8,250)
Sun Oil Co.	Jameson	Coke	July 1949	Canyon (6,430)
Sun Oil Co.	Millican	Coke	Feb. 1952	Strawn (5,950)
Various Operators	North Cowden	Ector	June 1950	Grayburg (4,400)
Various Operators	Goldsmith	Ector	1948	San Andres (4,225)

NOTE: All data to January 1, 1953.

A REVIEW OF 23 YEARS

by Pat E. Fletcher

A Look at Gas-Injection

THIS paper discusses gas-injection projects in West Texas from the initial project in 1930 to the present time. For 12 years prior to 1942, all gas was injected into sandstone formations, at relatively shallow depths. In recent years the trend has been toward injecting into limestone and dolomite formations, at increasing depths and at higher injection pressures and daily volumes. One company has a project under full pressure maintenance with the injected volume of gas equaling 150 per cent of the gas produced from the reservoir.

Reserves

Since the discovery of oil in West Texas in 1921, that portion has become the major oil-producing area in the state. In fact, about one-fifth of the nation's crude is produced in the Permian basin, which extends 250 miles through West Texas and eastern New Mexico. As a producer of crude oil, Railroad Commission District 8 in West Texas produces the equivalent of the daily production of the State of California.

It has been estimated that the oil reservoirs of the Permian age alone in West Texas originally contained 26.2 billion barrels of oil, an amount substantially greater than the accepted primary recoverable reserve of the United States. The report[1] stated that 11.7 billion barrels of this oil will never be recovered by primary means, or by presently known secondary-recovery means. Of the remaining 14.5 billion barrels of oil, only 4.8 billion will be produced by primary recovery (using recovery efficiency of 32.9 per cent) which means these great reservoirs will still contain some 9.7 billion barrels of oil and will be recovered only by the application of secondary means.

For the past several years, many new oil reservoirs of major importance have been added annually to the growing lists in Districts 7-C and 8 of West Texas and in eastern New Mexico. For example, during the past year a total of 61 new oil and gas pools were discovered in the Permian basin of West Texas. When this proven acreage is added to the present reserves of this vast area, the total proven acreage amounts to about 1¼ million acres, or an area one and one-half times larger than Rhode Island.

Start in 1890 . . . Since the initial gas-injection project in about 1890 in Venango County, Pennsylvania, (crude in its application by modern standards) hundreds of projects have been undertaken, extending through Pennsylvania, West Virginia, Ohio, Kentucky, Illinois, and into the Mid-Continent.

First extensive use of gas repressuring in Texas was in Petrolia field, Clay County. This project, involving 300 producing wells, was started in February 1926 by Western Oil Corp. by injecting purchased gas, obtained from Lone Star Gas Co., into three shallow sands. As an outgrowth of the success of the Petrolia program, a number of projects were commenced in North Texas with varying degrees of success.

It was not until the middle 1930's, however, that repressuring became widespread in that area, as well as tried in other parts of Texas. During the thirties, some interest was manifested in gas repressuring in West Texas. However, skepticism was evident regarding the benefits that would be obtained by gas injection into limestone oil reservoirs.

In 1940, some 10 years following the expanded use of gas-injection work in North Texas, there were 112 repressuring projects throughout Texas. These projects consisted of 537 injection wells, 4,202 producing wells, and encompassed a producing area of 43,570

Data to January, 1, 1953

Character of formation	No. of inj. wells	Gas inj., M.c.f./day	Total gas inj., M.c.f.	Injection press. (psi.)
Limestone	4	17,000		4,000
Limestone	12	26,500	10,101,286	4,000
Sandstone	16	863	7,538,100	
Sandstone	4	200	371,000	
Reef	1	5,726	756,714	
Reef	1	5,000	1,600,000	
Limestone	2	150-250	292,000	175
Dolomite	3	11,700	17,356,990	3,000
Limestone	1	1,115	321,397	1,650
Limestone	12	3,500	761,140	900-1,450
Limestone	9	750-1,000	1,708,128	600
Limestone	6	600		550-800
Limestone	3	9,000	400,000	1,800
Limestone	6	22,504	8,100,000	2,500-2,700
Sandstone	2	8,871	1,170,000	1,975-2,060
Limestone	63	16,700	9,577,000	1,600
Limestone	35	35,000	23,537,786	400-1,000
	177	148,354	83,591,541	

Projects in West Texas

Here's where a fifth of our oil comes from, and the story of how secondary recovery is carried on

acres. The ratio at this time was about one injection well to every eight producing wells. The highest injection pressure recorded then was 1,440 psi., injecting into a sand formation at 3,650 ft. This depth, incidentally, was about the deepest project in operation at that time, being exceeded only by a project in Coleman County which was injecting at a depth of 3,800 ft. and pressure of 400 psi. The higher injection pressure project was located in Sugarland field and was later discontinued due to bottom-hole pressure being maintained satisfactorily by curtailed withdrawals.

At close of 1946, 6 years later, the number of gas-injection projects in Texas was listed at 190, with a total of 710 gas-injection wells, 3,789 producing wells, and affecting a producing area of 34,629 acres. The ratio at this time was one injection well to every five and one-half producing wells. The highest injection pressure then was reported to be 1,120 psi., this for gas entering reef lime of Permian geological age in Hendrick pool, West Texas.

1940-1946 . . . It can be seen that gas injection increased during the first 6 years of the 1940's from 112 projects to 190 projects, or about 70 per cent.

Reliable information on a state-wide basis was not available for the next 5-year period, ended January 1, 1952. However, it is indicated there was a further increase since much progress had been made by the Railroad Commission in eliminating gas flaring and the need of applying secondary-recovery methods on near-depleted leases.

Early Projects in West Texas

In West Texas some 22 years ago the first gas-injection project was started on the Hayzlett lease, Shipley pool, Ward County, by Atlantic Refining Co. This small project, commenced in April 1930, consisted of only two injection wells and six producing wells. The gas was injected at 600 psi. pressure in Queen and Seven Rivers sand of Permian age at a depth of 2,700 ft., and at a daily rate of 200 M.c.f. The project was discontinued in the early part of 1941. Failure of the gas-supply well made it necessary to discontinue the operations.

Next project for West Texas was initiated in 1939 by Luce & Ice in Payton pool, Ward County. The project consisted of a combination gas-lift-and-repressuring program with gas injected into three key wells at a total rate of 1,250 M.c.f. per day. Injection pressure ran between 1,000-1,050 psi. The two leases affected (A. Blair and J. O. Brictson) by this program were located in one corner of the pool; therefore, it was considered possible to maintain pressure under a portion of the property without driving oil to other parts of the structure. The two leases totaled 332 acres and had 16 oil wells. Producing formation was Yates sand, averaging 60 ft. in thickness with about 23 ft. of very good oil sand in this particular area (well depth 2,100 ft.).

On this project gas was injected at 1,250 M.c.f. per day for 10 years. In the middle of 1949, it was discontinued for several reasons: lack of good gas supply, failure of offset operators to join in program, and plant economics. The project was considered successful by the operators since total lease production indicated some 1,500 bbl. additional oil per acre was recovered over that of offset wells. It is estimated about 4½ billion cubic feet of gas was injected.

In June 1940 another gas-injection project was started in North Ward-Estes pool by Gulf Oil Corp. The project included 1,865 producing acres, located about 4 miles northeast of Wickett, in Ward County. Producing formation consisted of a number of lenticular sand beds shading off and disappearing to the east, separated by layers of limestone in an indefinite pattern. Average depth is 2,750 ft., average pay thickness about 60 ft. It is locally known as the Yates sand, Permian age.

Eight key injection wells were selected initially, with gas injected on a volume-control basis. The volumes were increased gradually until at the end of 6 months, 550 M.c.f. per day was being injected into each input well. The injection pressures increased from 227 to 384 psi. Average bottom-hole pressure for the key injection wells increased from 192 to 350 psi. During this experimental period, a total of 414,744 M.c.f. of gas was injected with encouraging results. The production gains amounted to 16.5 bbl. per day per well, or a total increase of 528 bbl. per day for the 32 wells offsetting the 8 injection wells. This did not take into account the gains which

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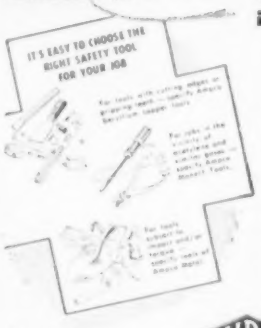

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may have taken place on diagonal or second-row offsets.

Two years after beginning, the gas-injection rate of the eight original key wells was reduced from 4,400 to 1,600 M.c.f. per day. In 1946 there were 16 key injection wells with daily injection rates of 156 M.c.f. per well, or a total of about 2,500 M.c.f. per day. Injection rates were later reduced until today the volumes of gas injected into the 16 wells averages 860 M.c.f. per day. The extent of gas bypassing, if present, is not known. From all indications the program appears to continue with successful results.

In Kermit pool, Winkler County, several gas-injection projects have been tried. Between 1940 and 1945, four programs were commenced to increase oil recovery from the Yates sand which varies in thickness from 20 to 40 ft. at depths of 2,800 to 3,100 ft. This pool was discovered in 1928 and comprises 17,000 productive acres. Of a total of about 900 original wells, there are presently about 500 producing, practically all on some type of artificial lift. The reservoir is of the solution gas-drive type.

Three of the earlier projects started by Sun Oil Co., Magnolia Petroleum Co., and Monday Oil Co. were discontinued after several years of operation. Sun's project included 2 injection wells and 12 producing wells on a 160-acre lease. The two injection wells took a total daily volume of 200 M.c.f. per day, pressure 450 psi.

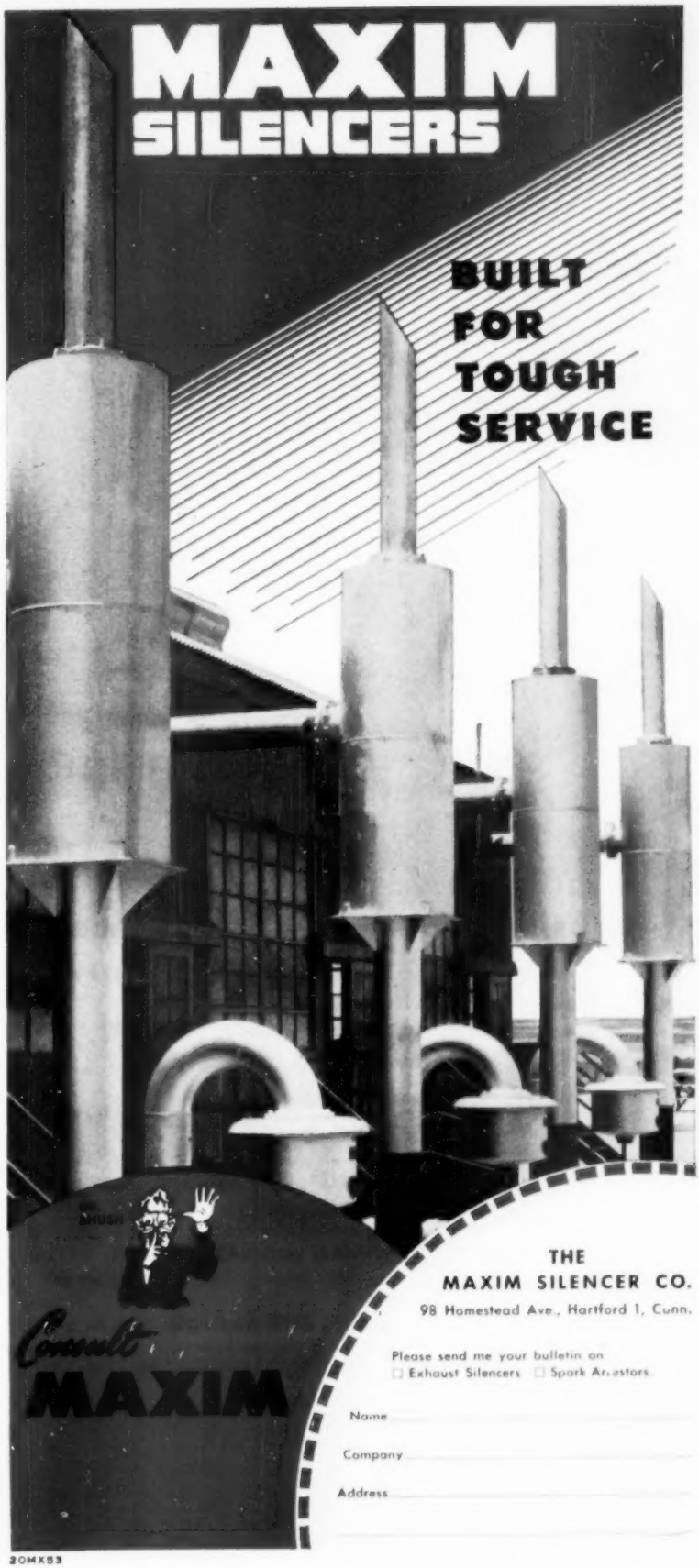
The project operated by Magnolia had 9 injection wells, 82 producing wells, on a 1,120-acre tract (wells on 10-acre spacing). The nine injection wells took 2,700 M.c.f. of gas per day at 400-600 psi. This was the largest project in the pool.

Monday Oil's program had 2 injection and 12 producing wells. A volume of 223 M.c.f. per day, at 225-350 psi., was injected.

Reasons for discontinuing these three programs is not known; however, gas bypassing is believed to have been quite high.

Gulf Oil Corp. in December 1944 started a gas-injection program in Kermit on its 240-acre Lum Daugherty lease. The project consisted of 6 injection and 18 producing wells. Initial injection was 525 M.c.f. per day at 150 psi, this rate decreased gradually until in 1952 it was 215 M.c.f. Due to a failing supply of gas, the program was discontinued in October 1952 after a total of 1,003,311 M.c.f. had been injected. Later a water-flood project was initiated.

In the prolific Hendrick pool of Winkler County, discovered in 1926,



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Stanolind Oil & Gas Co. started a gas-injection project in June 1946 into Yates-Seven Rivers lime reef of Permian age. Originally this pool had 425 wells; now it has 200 producers. Total recovery has been 222 million barrels of oil; the reservoir has a natural and very effective water drive. Many of the wells are being produced profitably with water percentages in excess of 99 per cent, volumes of fluid handled running 10,000 to 12,000 bbl. daily.

As an experiment, Stanolind injected gas into one well during June 1946. The injected gas was placed into the upper part of the reef pay section, while the water drive was effective from below. Gas bypassing to offset wells was eventually suspected and later confirmed by use of helium tracer. The project was abandoned on March 1, 1950, after a total of 285,765,000 M.c.f. had been injected during 4 years.

In October 1942 Stanolind conducted an experimental gas-injection project on its E. F. Cowden lease in Foster pool, Ector County. For some time authorities debated the advisability of injecting gas in limestone reservoirs because of possible gas bypassing through the fractured system. Purpose of this experimental pilot program was to study reservoir performance and gas-displacement characteristics of the Grayburg line.

The producing pay has an effective oil section of 18 ft. and is a sandy dolomite interspersed with layers of saturated porosity and permeabilities (8 to 14 per cent and 2 to 10 md.). Approximately 250 M.c.f. of gas per day at 1,555-2,130 psi. was injected into the one input well during the 22-month life. A total of 167 M.M.c.f. was injected before the experiment was terminated in 1944.

An excellent report covering this experimental project was prepared by L. E. Elkins.[2] Undoubtedly the outcome of this program was affected in some measure by the high allowables placed on the producing wells during World War II. When the program was started, well allowables were relatively small but were increased two or three times. It is interesting to note that although 167 M.M.c.f. of gas was injected into the injection well during the experimental injection period, it was returned to the status of a good oil producer when only 11 M.M.c.f. of gas were taken from the well.

Active Projects

During the 6-year period 1947-1952 the number of gas-injection projects in West Texas increased from 8 to 18. In this count the several individual projects in both North Cowden and

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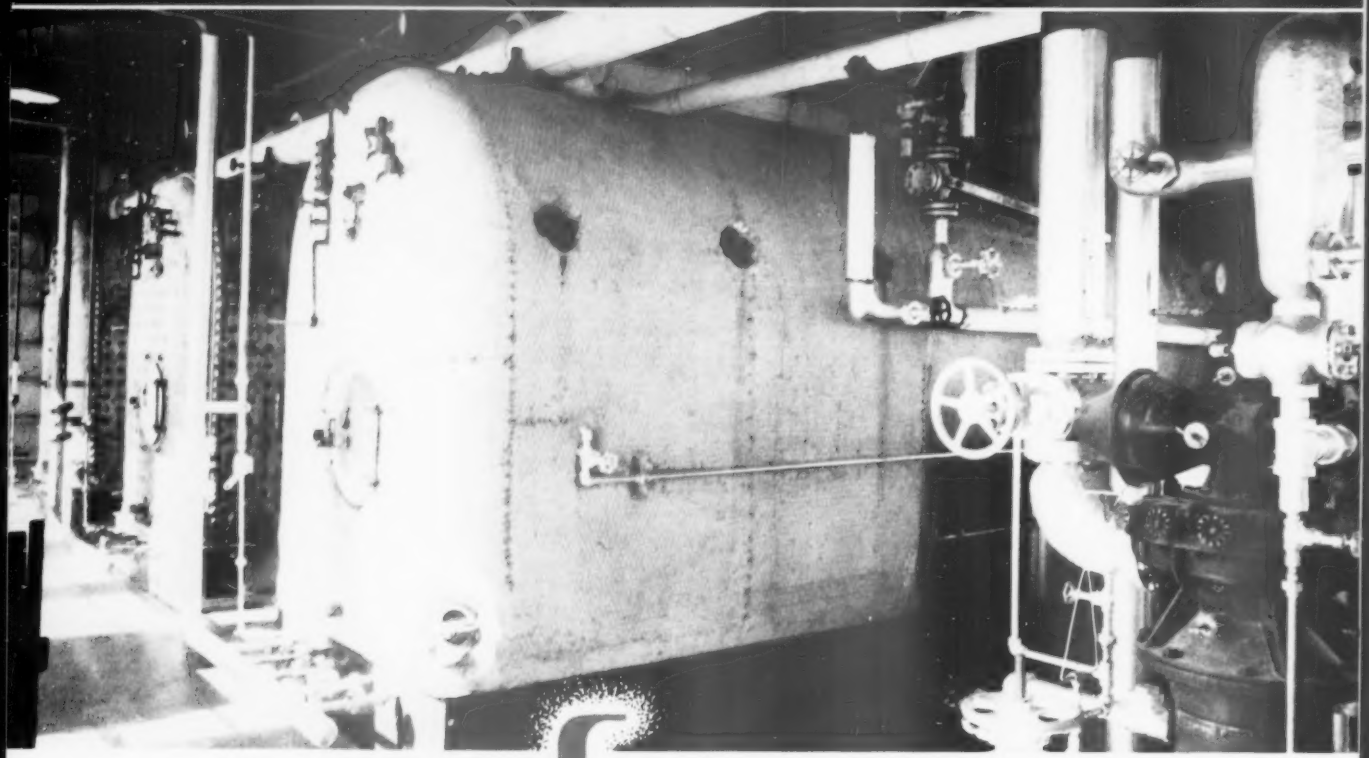

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Goldsmith pools are numbered as one since the projects in each pool are either cooperative in nature or receive their injection gas from a common source.

North Cowden project . . . Largest injection program in operation today in West Texas from standpoint of number of injection wells and area involved is North Cowden pool. This field was discovered in 1930, and is located in north-central Ector and south-central Andrews counties. Areal extent is 29,000 acres. Production is from the Grayburg formation, depth 4,450 ft.

A field study in 1947 indicated that gas injection would be beneficial in increasing the ultimate recovery. A plan was developed whereby the small tracts could be unitized into blocks of 640 acres. Unitization agreements covering approximately 66 per cent of the wells in the field were executed. A jointly owned gasoline and gas-injection plant was built, and gas injection started in June 1950.

During the initial phase, gas was injected into 33 wells, with a daily allocation to each injection well of 33 to 400 M.c.f. per day. Allocation was made chiefly on the basis of withdrawal from the unit block, but some wells were limited to the amount of gas that could be injected at the injection pressure of 1,600 psi. maintained by the plant.

During 1952 a second round of injection wells was added to many of the unit blocks, bringing the total number of injection wells to the present 63. Plans are being made to add eight more injection wells in the near future. At present, 29 per cent of the total produced gas from the field, or approximately 50 per cent of the produced gas from the injection area, is being returned to the formation. It is the ultimate aim of the project to return 70 per cent of the produced gas.

At end of 1952, daily injection volume was 16,700 M.c.f. per day into all injection wells. Cumulative total gas injected to January 1, 1953, was 9,577,000 M.c.f. It is considered too early to predict the success, if any, being attained. It is generally agreed that more benefit might be obtained if larger percentages of produced gas, on a field-wide basis, could be returned to the reservoir.

Goldsmith Pool Projects

Another large gas-injection program is being carried on in Goldsmith pool, Ector County. This pool covers 21,000 acres for the San Andres dolomite lime pay section. The pay has a thickness

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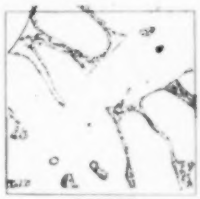

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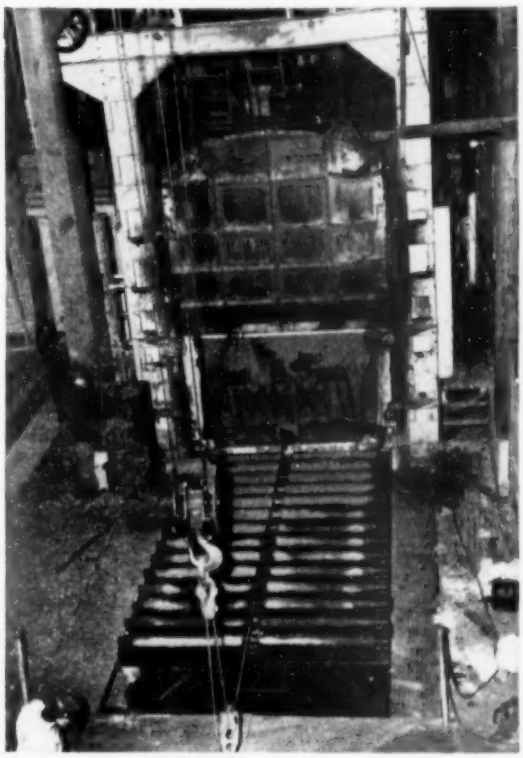

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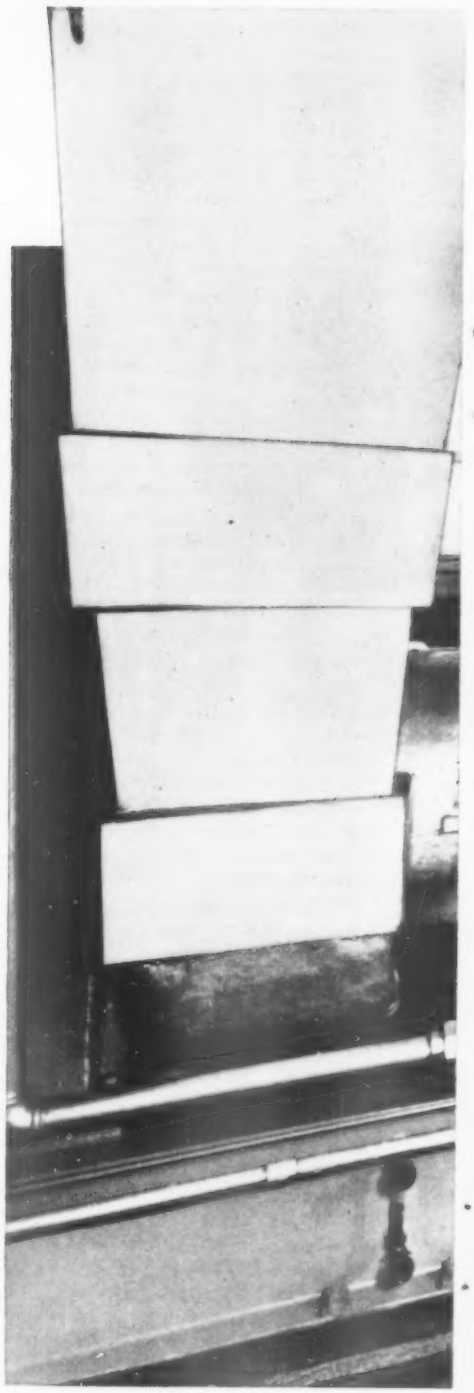

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Originally installed at Wilmar, Arkansas, it was later moved to Bonne Terre, Missouri—the market end of No. 1 main line. While operating at Bonne Terre, the turbine has been started, operated and taken off at temperatures as low as minus 20° F. Since its original installation, it has logged over 10,000 hours of service under gas-line dispatcher's control—increasing peak-hour flows and delivery pressure into St. Louis.

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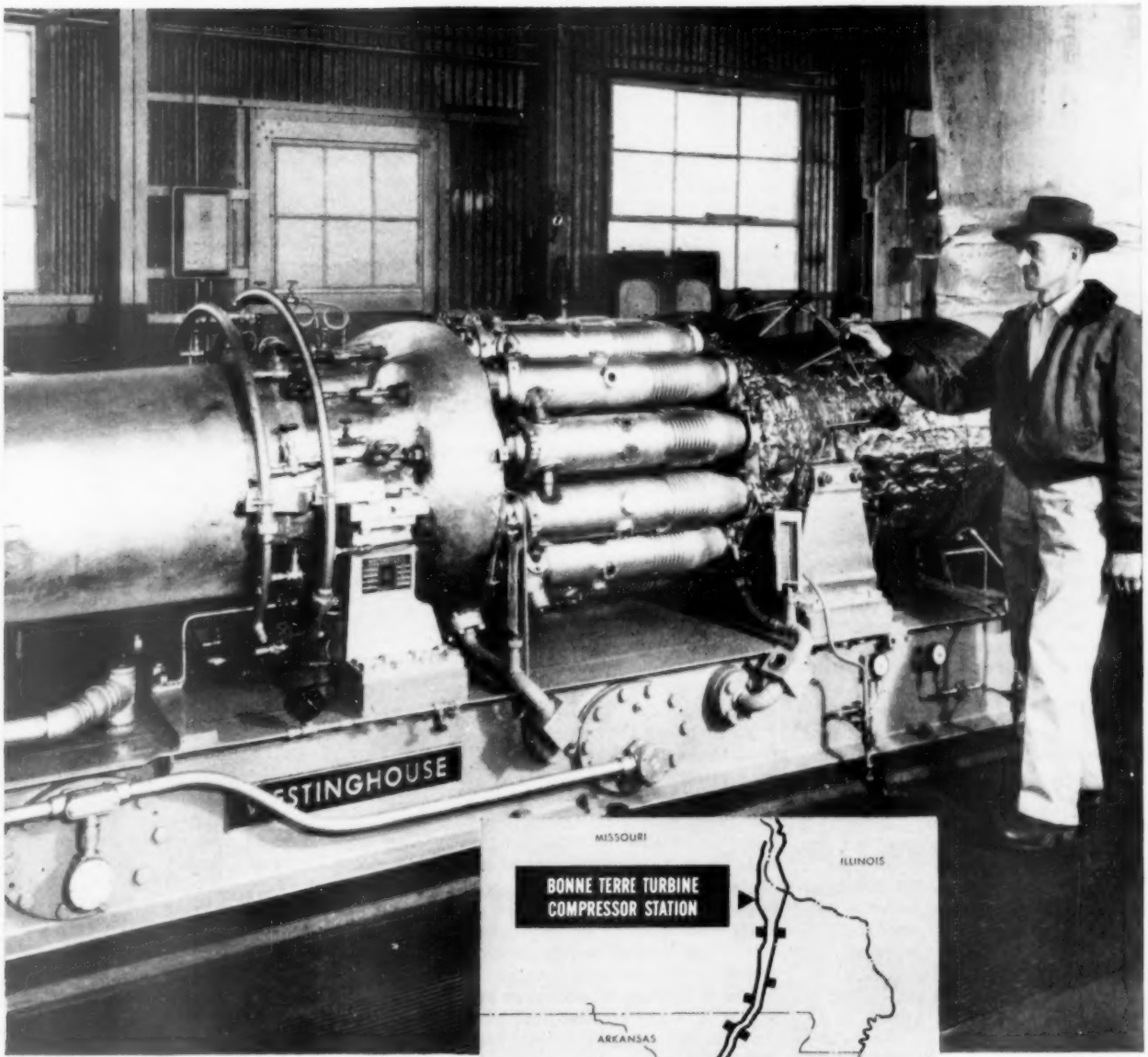

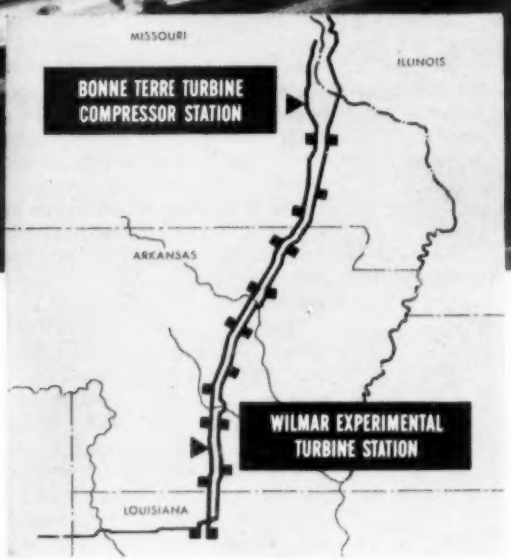

Initially placed in experimental service May 26, 1949, this Westinghouse Gas Turbine was moved to a permanent location on Mississippi River Fuel's gas line near Bonne Terre, Mo., in January 1951. It has since been utilized both for continuous and peak-load operation.

INACTIVE GAS-INJECTION PROJECTS—WEST TEXAS

Company—pool and county—	Date started	Date discont.	Name of formation	No. inj. wells	Gas injection, M.c.f./day	Total gas inj., M.c.f.	Inj. pressure (psi.)
Atlantic Ref. Co.—Shipley, Ward	1930	1941	Queen & Seven Rivers	2 3	200 1,250	7,000,000 4,500,000	600 1,000
Luce & Ice—Paton, Ward	1939	1949	Yates	2	200		450
Sun Oil Co.—Kermit, Winkler	1941		Yates	9	2,700		400-600
Magnolia Pet. Co.—Kermit, Winkler			Yates	2	223		225-350
Monday Oil Co.—Kermit, Winkler			Yates	6	525-215	1,003,311	150
Gulf Oil Corp.—Kermit, Winkler	1944	1952	Yates	1	250	285,765	1,120
Stanolind Oil & Gas Co.—Hendrick, Winkler	1946	1950	Seven Rivers*	1	250	167,000	1,555-2,130
Stanolind Oil & Gas Co.—Foster, Ector	1942	1944	Grayburg*	1	1,505-3,326	700,257	
Standard of Texas—Kelley-Snyder, Scurry	1951	1952	Canyon*	27	7,100-8,611		

*Limestone formation; others are sand.

of about 75 ft. and average porosity of 10 per cent.

The Goldsmith San Andres pool has two large gas caps, one located in the north part of the field and the other in the south. There is believed to be no effective water drive present with the energy producing the oil apparently coming from the expanding gas caps and from solution gas.

The 1,000 wells have produced in excess of 115,000,000 bbl. of oil to date, giving a present recovery of about 5,400 bbl. per acre. The initial solution gas-oil ratio was 757 cu. ft. per barrel, while the present average field gas-oil ratio is 5,000. The produced gas is very sour, having a hydrogen sulfide content of 1,400 to 1,800 grains per 100 cu. ft.

The injection program was commenced in 1948 on a rather modest scale. Since that time the program has grown and now includes seven operators, with total of 36 gas-injection wells. These individual projects are all located in the north part of the field. One of the largest operators, however, plans to commence a sizable secondary-recovery project in the south dome. This project will include a combination of gas and water injection and will cover an extensive producing area.

For the present the gas-injection work includes injecting gas into the gas cap only. This type of program is viewed with much favor by a number of operators, particularly with the field gas-oil ratios increasing and extending over much of the field. Practically all of the injected high-pressure gas is obtained from a field gasoline plant. A daily volume of about 35,000 M.c.f. is being injected at pressures ranging from 400 to 1,000 psi. On January 1, 1953, a total of 23,537 M.M.c.f. had been injected by these various projects in the Goldsmith program.

Block 31, Devonian Field

In less than 4 years following the discovery in 1945 of Block 31, Devonian pool, by Atlantic Refining Co., gas injection was commenced. This pool, located in Crane County, now encompasses a proved Devonian reservoir area of about 6,500 acres. Main axis of the anticlinal structure runs northeast-southwest. The Devonian section is at a 7,900-ft. depth, and is approximately 1,000 ft. thick. Best pay zone is 8,400-8,800 ft. and is estimated to contain 85 per cent of the oil in place. This zone is the only portion of the reservoir in which gas injection is presently taking place.

A study was commenced by Atlantic shortly after completion of the discovery well (1945), as it was indicated some form of pressure maintenance should be considered because of the low permeability (0.1 to 3 md.—sandy, dolomitic limestone) and the relatively low well productivity. On January 1, 1948, the operating interests of four companies were combined to form the Block 31 Joint Operations, with Atlantic as operator. This is possible because the entire producing area has the same royalty owner, the University of Texas Lands.

At that time the operation consisted of 4,160 acres, developed on a 160-acre pattern with 26 singly completed Devonian wells and 11 wells dually completed with the Ellenburger. Plans were formulated for the design and installation of a compressor plant and all necessary lines. All gas produced from the Devonian and the 11 dually completed Ellenburger wells was to be utilized. Two gathering systems were installed, one the high-pressure system which connected to separators operating at 125-psi. pressure and the second, the low-pressure system, took the remaining gas from field separators operating at 15 psi.

With the compressor plant completed, injection of gas was commenced into the Joint Operation "C" No. 2 well in July 1949. Injection rate was 3½ M.M.c.f. daily at 4,100 psi. The flowing injection pressure at the bottom of the hole (8,800 ft.) was recorded for 14 hours and was found to be 5,130 psi. When the well was shut in the pressure immediately dropped to 4,900 psi. and at the end of 28 hours, the pressure was 4,750 psi., declining at a rate of 3 psi. per hour. The average bottom-hole pressure of the reservoir at that time was 3,650 psi., dropping in the 3½ years from an initial pressure of 4,145 psi. During this period, the pool produced 3,700,000 bbl. of oil.

The Joint Operations were enlarged in January 1950 by adding 1,120 producing acres and a second addition of 960 acres was made on August 1, 1952, to bring the present total to 6,240 acres. There are at this time 51 producing Devonian wells, 16 producing Ellenburger (dual) wells, and 12 gas-injection wells in the Joint Operations.

The pool appears to be defined at this time and is developed on 80-acre spacing with the gas-injection wells located on a nine-spot pattern. It is planned to drill one additional injection well to complete the program that calls for a total of 13 injection wells. In expanding the Joint Operations, it also became necessary to enlarge the compressor-plant facilities.

From July 1949 (commencement of gas injection) to July 1951, a total of 4,200,000 bbl. of oil was produced with a drop in reservoir pressure from 3,650 to 3,450 psi. During the next year to July 1952, 2,950,000 bbl. of oil was produced with the reservoir pressure declining to a field average of 3,261 psi. By January 1, 1953, the Devonian field had produced a cumulative total of 12,360,000 bbl. of oil; and of this amount, 8,660,000 bbl. of oil was produced and 10,101 M.M.c.f. of gas injected, during the 3½-year period of the pressure-maintenance program. Decline in bottom-hole pressure for this period has been from 3,650 to 3,261 psi., or a drop of only 389 psi.

Because of the short time full pressure maintenance has been in effect, the results and benefits from the project are not yet known. There seems little doubt in the opinions of the research and reservoir engineers that the plan to increase ultimate oil recovery and maintain productivity of producing wells will be successful.

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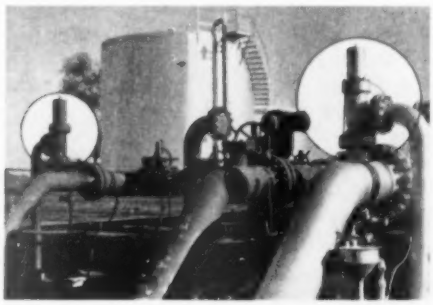

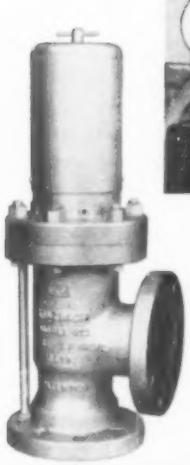

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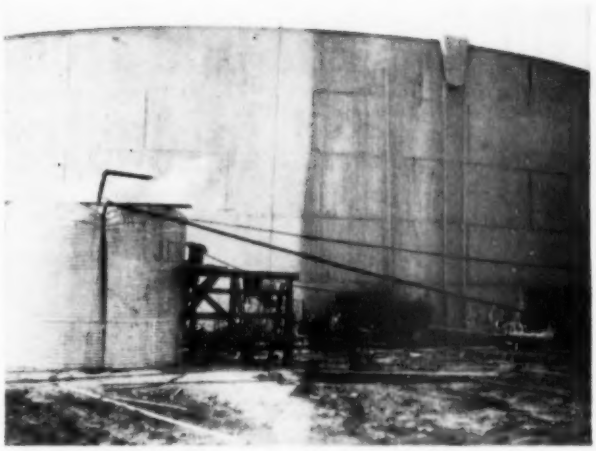

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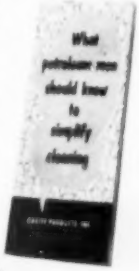

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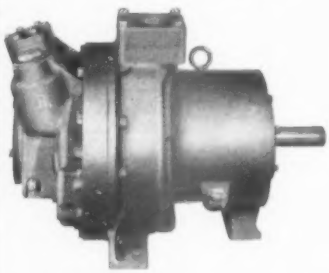

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located in northeastern Gaines County. The pool covers 3,840 acres; the southern limits are established but the northern limits are yet to be defined. Production comes from the San Andres limestone, of Permian age.

The reservoir fluid was undersaturated and had a bubble-point pressure of 326 psi. Prior to start of gas-injection, reservoir pressure had declined from 1,950 psi., when discovered, to 600 psi. Reservoir pressure in the gas-injection area has been maintained at or above 600 psi.

The injection project was on leases of Stanolind in the southern portion of the pool. In April 1946, gas injection was started in one well; by November 1946 the number of injection wells had been increased to eight. The ninth injection well was added in October 1948. As a result of the success of the project during the first 5 years of operation, a unit was formed in the southern part of the field in the early part of 1951. Production during the first 5 years of the project was estimated to have been 400,000 bbl. more than under primary depletion.

Principal source of injection gas is from two Yates gas wells, which gas is high-pressure and does not require compression. Excess gas requirements is obtained from Homann field, which also produces from the Yates sand. The gas from Homann field is delivered to the compressor plant at 325 psig. and is compressed to 1,600 psig. in two stages.

Scurry County

Two important and apparently very successful gas-injection projects are in operation in Scurry County in Kelley-Snyder pool (discovered in 1948) and in Diamond "M" pool (discovered in 1949). Production from these connecting pools is from the Canyon reef lime, Pennsylvanian age, depth 6,800 ft.

Two and one-half years following discovery of Kelley-Snyder, which has average pay thickness of 225 ft., the initial bottom-hole pressure had dropped from 3,122 to 2,316 psi. During this period the pool produced 28,304,000 bbl. of oil.

In Diamond "M" pool the reef lime pay is 45 ft. thick and had an initial bottom-hole pressure of 3,120 psi. Diamond "M" also rapidly dropped in bottom-hole pressure in 1950, to 1,981 psi. Well allowables were reduced and pilot gas-injection plants were started.

In July 1951, with bottom-hole pressure at 2,000 psi., two pilot plants were started in Kelley-Snyder by Lone Star Production Co. and Standard Oil Co. of Texas. One well was used in each pilot project with Lone Star injecting 5,000 M.c.f. per day. On January 1, 1953, a total of 1,600 M.M.c.f. of gas had been injected. This company reports bottom-hole pressure increased about 40 psi. in the immediate area.

Standard of Texas' project was in operation 1 year before being discontinued. Daily injected volume amounted to an average of 1,500 M.c.f. at the start of the program in July 1951 and was increased to 3,326 M.c.f. by April 1952. A total of 700,257 M.c.f. of gas was injected. Results from this pilot experiment were considered successful by the operator.

During July 1952, Lion Oil started an injection project in Diamond "M" pool. The one injection well is taking gas at 5,725 M.c.f. per day; total injected volume amounted to 756,714 M.c.f. to January 1, 1953.

Coke County Projects

Sun Oil Co. commenced its Jameson pool project in July 1949. It includes six wells injecting into the Canyon lime. Pay thickness is 190 ft., depth 6,450 ft. The pool, discovered in 1946, covers 3,600 acres. Initial bottom-hole pressure was 2,745 psi. It had dropped to slightly less than 2,400 psi. when gas injection was started 3 years after discovery. Present injection rate is 22,500 M.c.f. per day. Total of 8,100 M.M.c.f. had been injected in 3½ years.

The same company commenced another important project in Millican pool in February 1952. Production is obtained from the Strawn sand, Pennsylvanian age, depth 5,950 ft. The sand has a thickness of 85 ft. At discovery in 1948, the bottom-hole pressure was 2,524 psi. The two injection wells are receiving 8,871 M.c.f. per day at an injection pressure of 1,975-2,060 psi. A total of 1,170 M.M.c.f. has been injected. The results from these two projects appear most satisfactory to date.

White & Baker . . . This project, located in Pecos County, was started in August 1947, and is injecting 200 M.c.f. of gas per day into the Queens sandstone, depth 1,785 ft. As of January 1, 1953, a total of 371,000 M.c.f. of gas had been injected into the four injection wells.

Clara Couch . . . Gas injection for the Clara Couch project, located in Crockett County, started in March 1948. A daily volume of 150-250 M.c.f. of gas per day is being injected into the San Andres limestone at a depth of 2,080 ft., using two injection wells. As of January 1, 1953, a total of 292,000 M.c.f. of gas had been injected. Injection pressure is 175 psi.

Sinclair's Midway Lane . . . This project in Crockett County has been in operation since May 1949 and is injecting a daily volume of 11,700 M.c.f. of gas into four Ellenburger wells. Depth is 7,600 ft.; well-head pressure is 3,000 psi. As of January 1, 1953, a total of 17,356,990 M.c.f. of gas had been injected.

Sinclair's Shafter Lake . . . This project in Andrews County was started in December 1951. One well injects a daily volume of 1,115 M.c.f. of gas into the Devonian limestone. Depth is 9,900 ft.; well-head injection pressure is 1,650 psi. As of January 1, 1953, a total of 321,397 M.c.f. of gas had been injected.

Other Stanolind Projects

Other projects of considerable importance are three in operation by Stanolind. In January 1952, Stanolind started its Anton-Irish project in Lamb and Hale counties. This program consists of 12 injection wells. A daily volume of 3,500 M.c.f. per day is injected into the Clearfork lime. Average depth is 6,100 ft.; injection pressure is 900-1,450 psi. A total of 761,140 M.c.f. of gas has been injected.

During November 1952 a second project was started by Stanolind in Three Bar pool, Andrews County (discovered 1945). It produces from the Devonian dolomite, depth 8,250 ft. Three injection wells take 3,000 M.c.f. per day per well at 1,800 psi.

The most recent project started by Stanolind in West Texas is one located in Midland Farms pool, Andrews County, six injection wells receiving 600 M.c.f. of gas daily. Injection is into the Grayburg limestone, depth 4,800 ft.

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Ulysses Plant Now Stanolind's Largest

(Continued from page 158)

tuating medium for the steam trap and discharge is to a lower pressure. In the case of the lift trap external gas pressure is employed to displace the liquid to a higher pressure.

Liquid flows by gravity from the scrubber into the lift trap and accumulates there. When the proper level has been built up inside the trap a small stream of gas at higher pressure enters the lift trap and displaces the liquid back into the still-top product accumulator.

In the event that the lift trap should fail and liquid level builds up in the scrubber the level alarm will sound to warn the operator. Further buildup of level will cause the high-level control to act, shutting off fuel gas to the recompressors. At the same time fuel gas will be vented from the fuel-gas line downstream of the shutoff valves. By this means liquid from the recompressor suction scrubber can be prevented from reaching the recompressor cylinders.

Fractionation System

The deethanizer feed surge tank receives still-top product from both plants and effluent from the recompressor discharge cooler. Bottoms product from the deethanizer is returned to each plant in amount proportional to the quantities of gas processed by each plant. Uncondensed vapor leaving the surge tank goes through a section of steam-jacketed line and a back-pressure control valve. The steam-jacketed section prevents vapor from freezing as it passes through the control valve. The vapor then divides into two streams to the absorber inlet gas headers of each plant.

Deethanizer . . . Feed rate to the deethanizer is controlled by a liquid-level controller on the feed surge tank which resets the flow recording controller in the deethanizer feed pump discharge. The deethanizer is a 66-in.-i.d. vessel equipped with 30 bubble trays. The reflux accumulator level controller resets a flow recording controller that regulates the steam rate to the deethanizer reboiler, thus controlling the amount of propane that goes overhead to be condensed and returned as reflux. The reflux rate is held constant by a flow recorder controller in the reflux line.

The amount of noncondensables leaving the accumulator is controlled by a pressure recording controller, thus maintaining the operating pressure on the deethanizer. Here also the vapor goes through a steam-jacketed section of line to prevent freezing in passage through the control valve.

Cascade control . . . Deethanizer bottoms product, essentially propane and heavier, is cooled by exchange with incoming feed, then split into two streams, one going back to the depropanizer in the original plant, the other to the new depropanizer. The liquid-level controller on the deethanizer reboiler resets the flow recording-controllers on each of these streams in proportion to the relative gas loads of the respective plants.

Depropanizer . . . This is a 48-in.-i.d. 35-tray column fed by pressure differential through the depropanizer feed exchangers. The column is designed to produce approximately 95 per cent pure propane overhead. Since the depropanizer operates with a total condenser, pressure on this column is maintained through bypass of a portion of the overhead stream around the condenser. The control valve, operated by the pressure recording controller, is set in the bypass. A back-pressure control relief to flare is provided. This will operate in the event that deethanizer operation becomes upset allowing an abnormal amount of ethane to remain in its bottom product.

The steam rate to the depropanizer reboiler originally was controlled by a temperature recording controller actuated by a temperature bulb located on the twenty-fourth tray from the bottom of the column. This control scheme is shown in the flow diagram. Operation of the depropanizer has also been attempted with the temperature-controller bulb in the reboiler vapor line, in addition to its present location on the twenty-fourth tray.

The depropanizer control system has since been revised so that the temperature instrument controls reflux flow. Steam rate to the reboiler has been put on flow control.

Debutanizer . . . The 54-in.-i.d. 30-tray debutanizer is designed to produce a bottoms product varying from completely debutanized material to a 26-psi. R.v.p. product. Pressure and temperature control on this column is similar to that on the depropanizer. A temperature recording controller controls steam rate to the debutanizer reboiler. The primary element (thermometer bulb) for this application is placed in the reboiler vapor line.

The liquid-level controller on the debutanizer-reflux accumulator is provided with dual pilots, the first of which regulates the quantity of butane flowing to storage. The second pilot resets the flow recorder controller that controls the feed rate to the deisobutanizer. This control scheme provides an additional measure of deisobutanizer feed rate adjustment, in the event of extreme fluctuations in liquid level in the debutanizer reflux accumulator.

Deisobutanizer . . . This column is 66-in. i.d., and is equipped with 60 trays. In view of the relatively greater difficulty involved in producing specification products from the deisobutanizer the instrumentation of this unit must be different from that of the preceding columns. To eliminate effect of change in cooling-water rate or temperature on the operating pressure of the deisobutanizer, the rate of withdrawal of overhead vapor to the condenser is regulated by a pressure recorder controller with control valve in the overhead vapor line.

To insure sufficient suction head, under all conditions of weather and cooling water, for the deisobutanizer-reflux pump, the reflux accumulator is pressures by bleeding a portion of the overhead vapors, through a bypass around the condenser, to the accumulator.

Vapor-pressure controller . . . To compensate for changes in feed composition or small variations in feed rate a vapor-pressure controller is employed to reset a flow recorder controller which controls the deisobutanizer reflux rate. The vapor-pressure controller operation involves comparison of the pressure on a selected tray with the vapor pressure of a liquid in a bulb located on that tray.

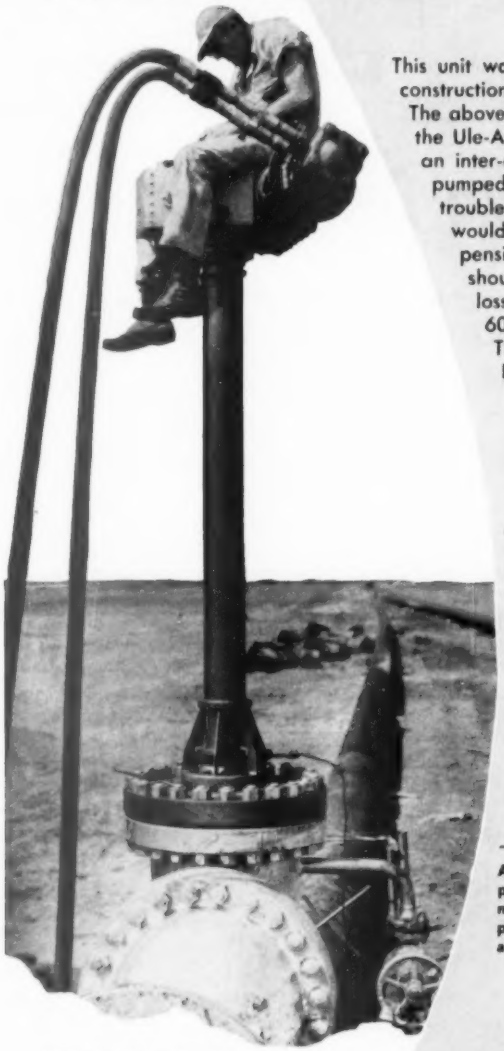
The bulb is filled with liquid taken from the selected tray during normal operation. A change in composition on the tray with consequent change in tray temperature will produce a different vapor pressure in the bulb and a pressure differential between the bulb and the column. This results in reset of the flow recorder controller in the reflux line to adjust rate of reflux so as to counteract the change which took place on the selected tray. Note that in deisobutanizer operation a variation of 1 psi. in pressure can result in a temperature change of about 2½° F. This represents several per cent variation in terms of composition.

Experience with the vapor-pressure controller in the deisobutanizer has indicated satisfactory and very sensitive control. The vapor-pressure bulb has never been changed from its original location on the forty-eighth tray.

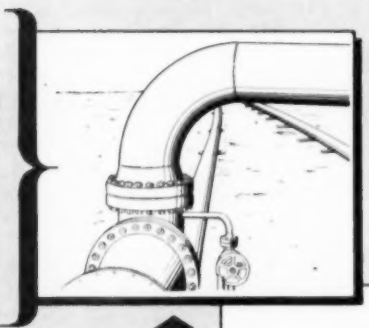
Solution to a Big-Inch problem!

Such as installing a 24" tee in a 30" high-pressure pipe line without loss of fluid, accomplished by using a

WmSON-HILLCO Model 1200 Tapping Machine



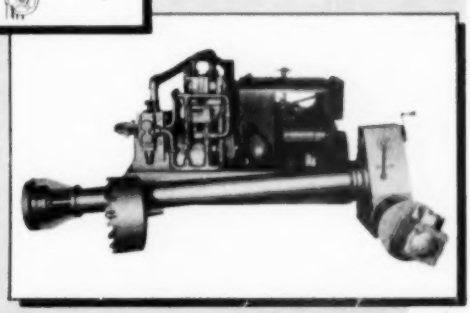
This unit was purchased by Williams Brothers for use on a construction job for Creole Petroleum Corp. in Venezuela. The above-ground 26" oil line paralleled an existing 26" line, the Ule-Amuay Line, which crosses Coro Bay. At either shore an inter-connection was needed so that both lines could be pumped through either of the under-water lines, in event of trouble with the other. To install two tees in the existing line would necessitate a shut down and line drainage, an expensive operation. So Creole specified that Williams Brothers should simulate a tee at each location—without shutdown or loss of oil. This was accomplished by attaching a 20" ASA 600# gate valve to a flanged fitting welded to the pipeline. The tap was completed with the New Model 1200 Wm-SON-HILLCO Tapping machine, which cut a 19" coupon from the line under pressure of 800 to 900 psi. This machine is operated by a Vickers hydraulic motor mounted on the gear case and connected by two hoses to the hydraulic pump which is driven by a gasoline engine.



After removing 19" coupon and closing 20" valve, machine is replaced with piping assembly shown above.

Specifications:

Max. tap through ASA 600# Valves	24"
Boring Bar Travel	72"
Weight of bare machine	2115 lbs.
Packing rated at	1,200 psi at 100°F 500 psi at 500°F



Hydraulic power unit with WmSON-HILLCO Model 1200 Tapping Machine and 20" Insertooth Cutter.

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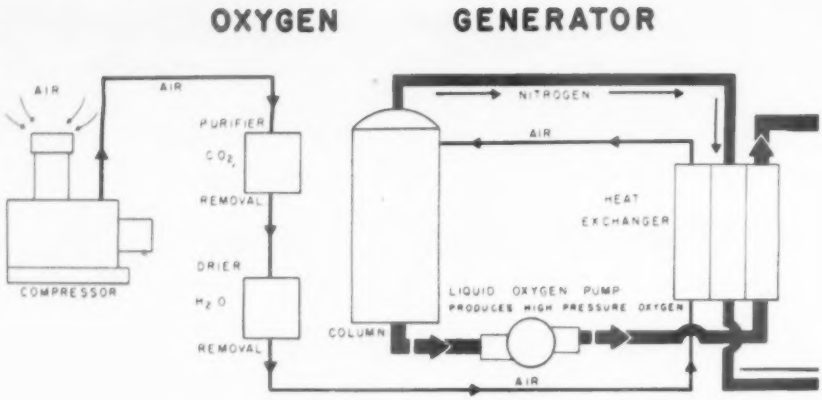
PROCESS STEPS for manufacture of ammonia and urea by partial oxidation of natural gas in the Grace Chemical Co. plant to be built near Memphis, Tenn. Fig. 1.



PETROCHEM REPORT:

Grace Chemical Will Make Ammonia, Urea

Plant will produce 250 tons of ammonia per day, using the Texaco-licensed process of partial oxidation of natural gas at pressure of 28 atm.

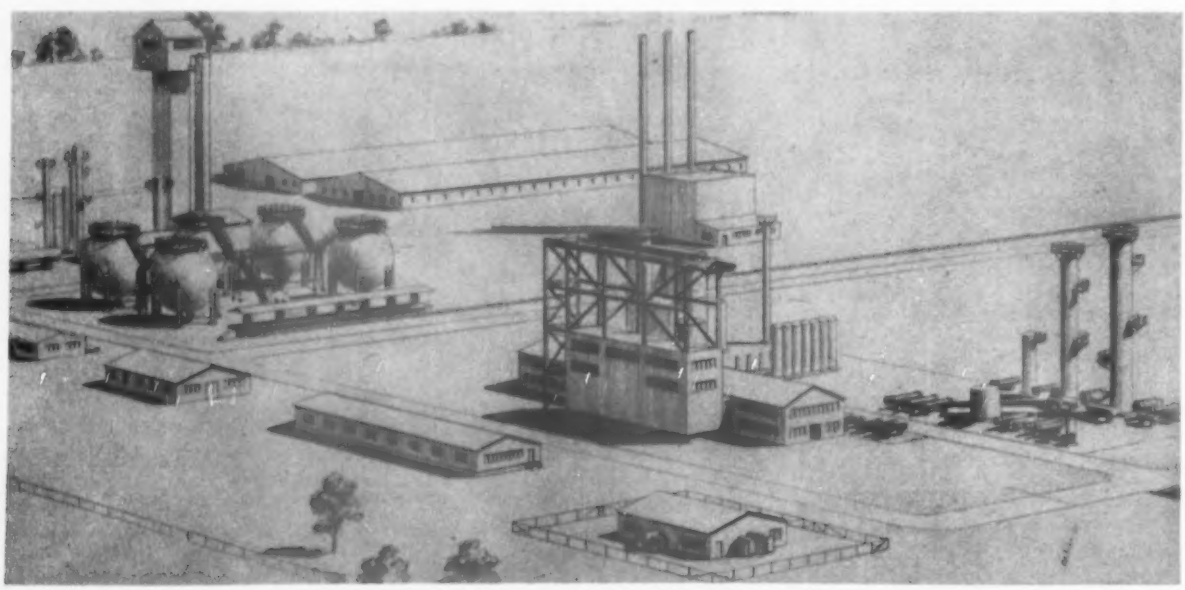
A KEY item in the $19,000,000 ammonia and urea-fertilizer plant, to be built for Grace Chemical Co. at Woodstock near Memphis, Tenn., will be a high-pressure oxygen generator with a capacity of over 200 tons of oxygen and 300 tons of nitrogen daily.

Upon completion in 1954 the Grace plant will produce 250 tons of ammonia per day by partial oxidation of natural gas, a process licensed by the Texaco Development Corp.

The first United States plant to employ this process is Spencer Chemical Co. installation at Vicksburg, Mass., now under construction. The Spencer plant, scheduled for completion this year, will have a capacity of 200 tons of ammonia daily and will employ the first large-capacity (slightly smaller than the Grace installation) liquid-oxygen generator ever built.

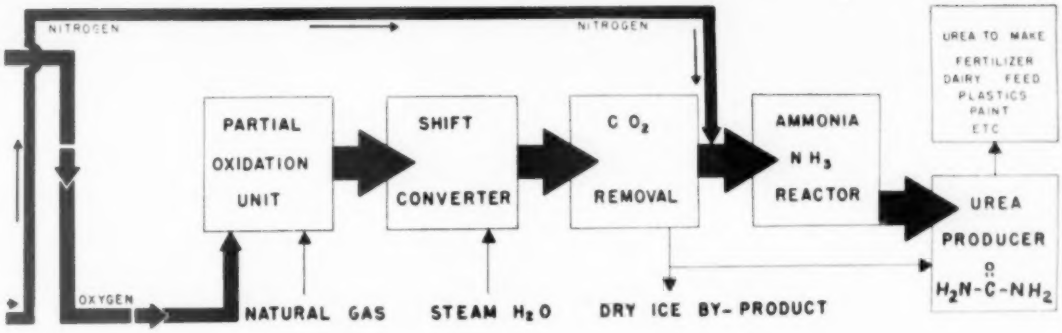
Both plants are in line with a government program aimed at expansion of U. S. nitrogen production capacity. The Defense Production Authority has set a goal of nearly 3,000,000 tons annually of nitrogen by 1955. Current output is reported to be about 2,000,000 tons a year *(See "Boom in Ammonia" by K. B. Barnes, The Oil and Gas Journal, February 16, 1953, page 95 for story on ammonia plant growth and description of the Spencer Vicksburg installation.)*

Partial oxidation process . . . This is conducted at a pressure of about 28 atm., rather than at atmospheric pressure as in catalytic steam-methane reforming, for the production of synthesis gas. The ammonia reaction is conducted at pressures in the neighborhood of 200 atm. A significant reduction in the synthesis gas compression load is



LARGEST LIQUID-OXYGEN GENERATOR is shown at center in this artist's sketch of Grace Chemical ammonia plant. Over-all dimensions of the oxygen unit will be 60 by 40 by 20 ft. Capacity will be 200 tons daily of high-pressure oxygen and 300 tons per day of nitrogen.

UREA PLANT



therefore achieved when employing the partial-oxidation method. Savings in compression cost is one of the important factors leading to current interest in the partial oxidation method.

The large-capacity, high-pressure oxygen units for the Grace and Spencer plants are manufactured by Air Products, Inc. Oxygen was supplied at atmospheric pressure by the earlier-developed, low-pressure generators, requiring compression of the oxygen to 400 psi. for the partial-oxidation process. Largest high-pressure units in operation before manufacture of the Spencer oxygen generator were three 12-ton units used by the steel industry.

Basic steps in the Grace Chemical Co. plant processing are indicated in Fig. 1. To produce oxygen for the partial oxidation of natural gas air is first compressed to 100 psi. and goes through a sodium hydroxide scrubber to remove CO_2 and through driers. It is then further compressed before entering the oxygen generator.

1. Oxygen Manufacture

Air is separated in the oxygen plant into 90 per cent pure liquid oxygen and 99.9 per cent pure nitrogen gas. The air goes through a heat exchanger and an expansion valve, the stream temperature being lowered to about -300° F.

This is followed by distillation in two stages, at 80 psi. and at 4 to 8 psi. with nitrogen gas taken off overhead and liquid oxygen collected as bottoms product at approximately 4 psi.

A liquid oxygen pump (Air Products, Inc. patent) handles the oxygen at 400 psi. Handling of liquid oxygen at this pressure, rather than compression of oxygen gas to 400 psi., is the key to successful high-pressure oxygen manufacture. Compression of oxygen gas to relatively high pressure can be accomplished but compressor maintenance costs are too high.

Nitrogen and liquid oxygen streams are circulated through the heat-exchange system as cooling media for the incoming air. These streams leave the exchanger at atmospheric temperature with the nitrogen at a pressure of about 1 psi. and the oxygen now as a gas at 400 psi. The oxygen is fed to the partial-oxidation step while nitrogen goes to the ammonia-synthesis step.

2. Making Synthesis Gas

Manufacture of synthesis gas containing hydrogen for the ammonia reaction is accomplished in existing plants by reacting natural gas and steam over a nickel catalyst at atmospheric pressure. The partial oxidation method is a high-pressure noncatalytic method. The synthesis gas mixture resulting from partial oxidation of methane consists principally of CO and H_2 with some CO_2, water vapor, and unreacted CH_4.

Development of the partial oxidation method was delayed by lack of an economic source of high-pressure oxygen. Attempts to make the process work with low-pressure oxygen units were not completely successful due to difficulty and relatively high cost of compressing oxygen gas to 400 psi. One problem was the high reactivity of oxygen under pressure. For example, reaction of oxygen with compressor lubricating oil created a serious maintenance problem. Maintenance problems existed even with compressors specially designed for lubrication with water or glycerin.

3. Shift Conversion

Synthesis-gas and steam enter the shift converter in which CO is oxidized to CO_2 and additional H_2 is generated. The CO_2 is then removed. A smaller portion of the CO_2 may be utilized for dry-ice manufacture. The principal use of the CO_2 is in a later step of processing to convert ammonia to urea.

4. Ammonia and Urea Manufacture

Grace Chemical Co. will employ the Casale process for ammonia synthesis. Grace plans to sell a portion of its ammonia output for fertilizer production and as raw material for eventual manufacture of products such as synthetic fibers, rocket fuel, and explosives. Part of the NH_3 will be reacted at the Grace plant with CO_2 to make urea by the standard Pechiney cycle.

Urea, a white crystalline solid with the formula $NH_2 — CO — NH_2$ contains close to 50 per cent nitrogen by weight. This high nitrogen content, plus its ease of handling, makes urea particularly suitable for fertilizer. Urea also goes into animal feedstuffs. Industrially it finds use in manufacture of ureaformaldehyde plastics, stove and refrigerator-enamel finishes, resin glues, textile finishes, and ammoniated toothpaste.

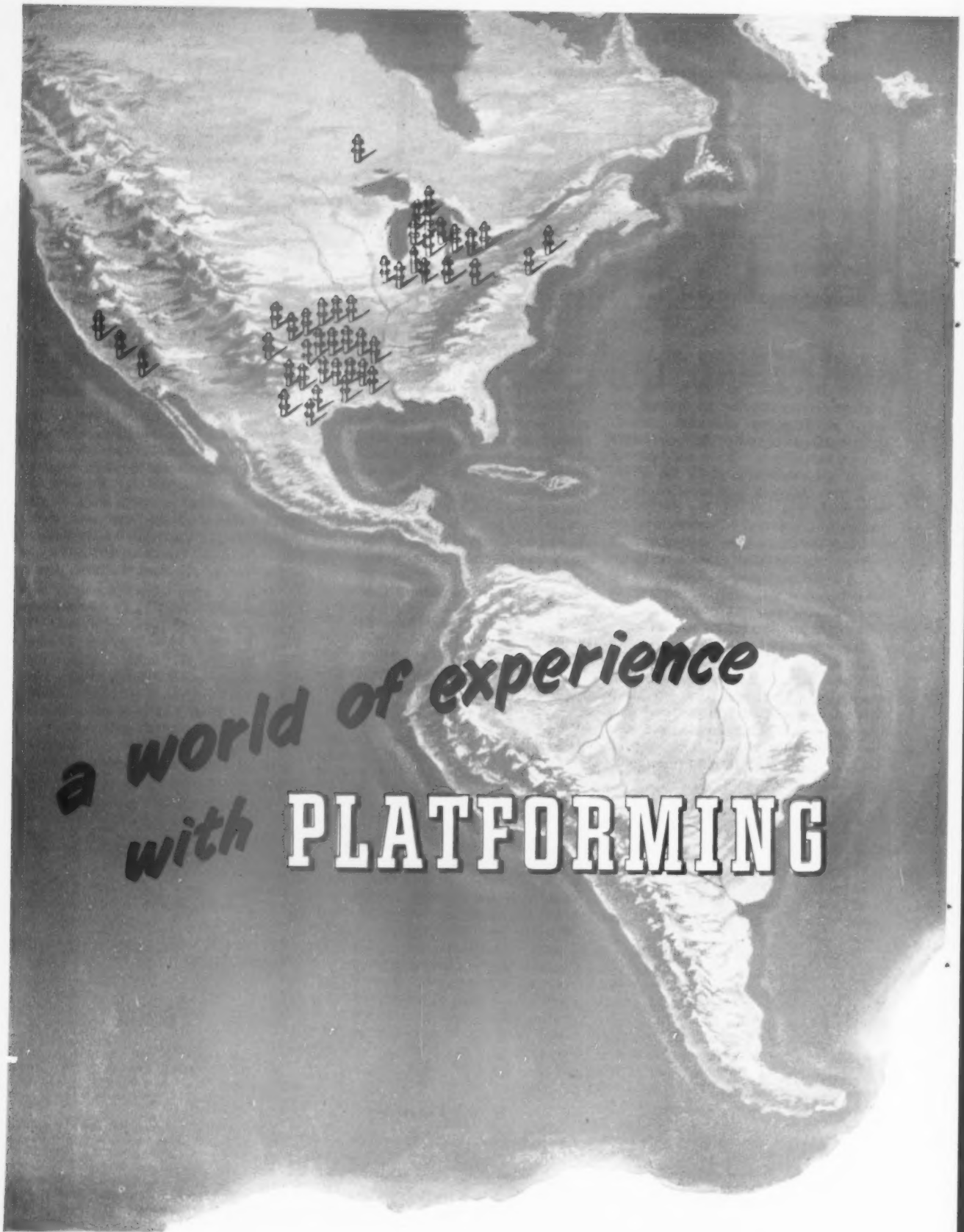
Grace Chemical Co. is a subsidiary of W. R. Grace Co. The Woodstock plant will mark the entry of this company into the petrochemical field. W. P. Gage is president and a director of the company. John G. Carriere is plant project manager and will become plant manager after its construction.

Foster Wheeler Corp. is engineering contractor for the plant.

BOOK

REVIEW OF INTERNATIONAL COMMODITY PROBLEMS—1952. A United Nations Publication. Published by Columbia University Press, 2960 Broadway, New York 27. 51 pp. 50 cents.

This review was prepared by the Interim Coordinating Committee for International Commodity Arrangements. In addition to presenting the customary summary of developments in the year, the review takes note of a change in the climate of opinion which seems to be taking place in regard to intertional commodity policy.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LOOKING up the mast, showing "straddle board."

"Straddle Board"

Gadget assists derrick man when racking pipe

THE crew working on Brack Oil Co.'s Rig No. 1 dreamed up a gadget which is of great assistance to the derrick man when racking pipe on the setback.

Called a "straddle board," the unit is a 15-in. wide flat metal plate attached to the derrick man's platform with hinges. It can be laid out flat as a step or folded over against the platform when not needed.

The straddle board provides an extra footing for the derrick man when laying back an outside stand of drill pipe. It thus provides a "feeling of security," even when his safety belt is hooked in the retaining ring.

Chute Used to Lay Down Drill Pipe; Work Speeded

A two-piece chute is being used regularly for laying down drill pipe when a well has been completed, or when changing drill-pipe size. This tool is used instead of a highline when lowering a joint from the floor and is said to speed the job materially.

Two pieces of split pipe are used for the trough of the chute, one attached to a sloping frame containing a spool-shaped roller at the higher end. The second piece attaches to the first at the lower end to form a continuous slideway for the joint as it is transferred from the floor to the walk between the pipe racks.

Folding Floodlight Towers Are Used for Lighting Rigs

All drilling rigs of Clyde Hall, Bakersfield, Calif., drilling contractor, are supplied with folding floodlight towers which provide plenty of light for nighttime operation.

The towers are so designed that they can withstand terrific winds without falling. At the same time they are high enough to spread the light effectively over the entire drilling-rig area.

They have a central standard of pipe, which is equipped with stirrup-like rungs for men to ascent for replacing bulbs or adjusting spread of illumination.

Top of the central post is fitted with a horizontal beam, diagonally braced, to support two standard flood lamps on swivel bases. They can be turned in any direction.

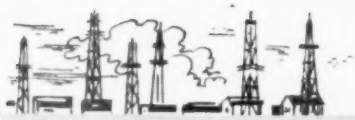
About 10 ft. from the lower end of the supporting post is a clamp containing three hinges, equally spaced, to connect three diagonal braces whose other ends are connected with three horizontal "feet" which lay flat on the ground.

Diagonal braces are attached to the horizontal feet with clevis pins and the unit is sturdy enough to require no other bracing or guy wires. Electric cable is strung along the ground from the central light plant and carried through retaining loops to the top.

Chain Is "Ever Ready" On This Rotary Drilling Rig

When the kelly has been sunk a foot or so after setting a fresh joint of drill pipe, the next joint to be used is lowered into the mouse hole. Immediately after the sling has been taken away, one of the floor men wraps the spinning chain around the pipe in preparation for making up the joint when the kelly has been sunk into the rotary table.

The chain is supported upon a circular rubber pad, used elsewhere around the rig, to hold in position so that it will slide gently down the joint of pipe until it has reached the bottom part of the tool joint. This operation saves time.



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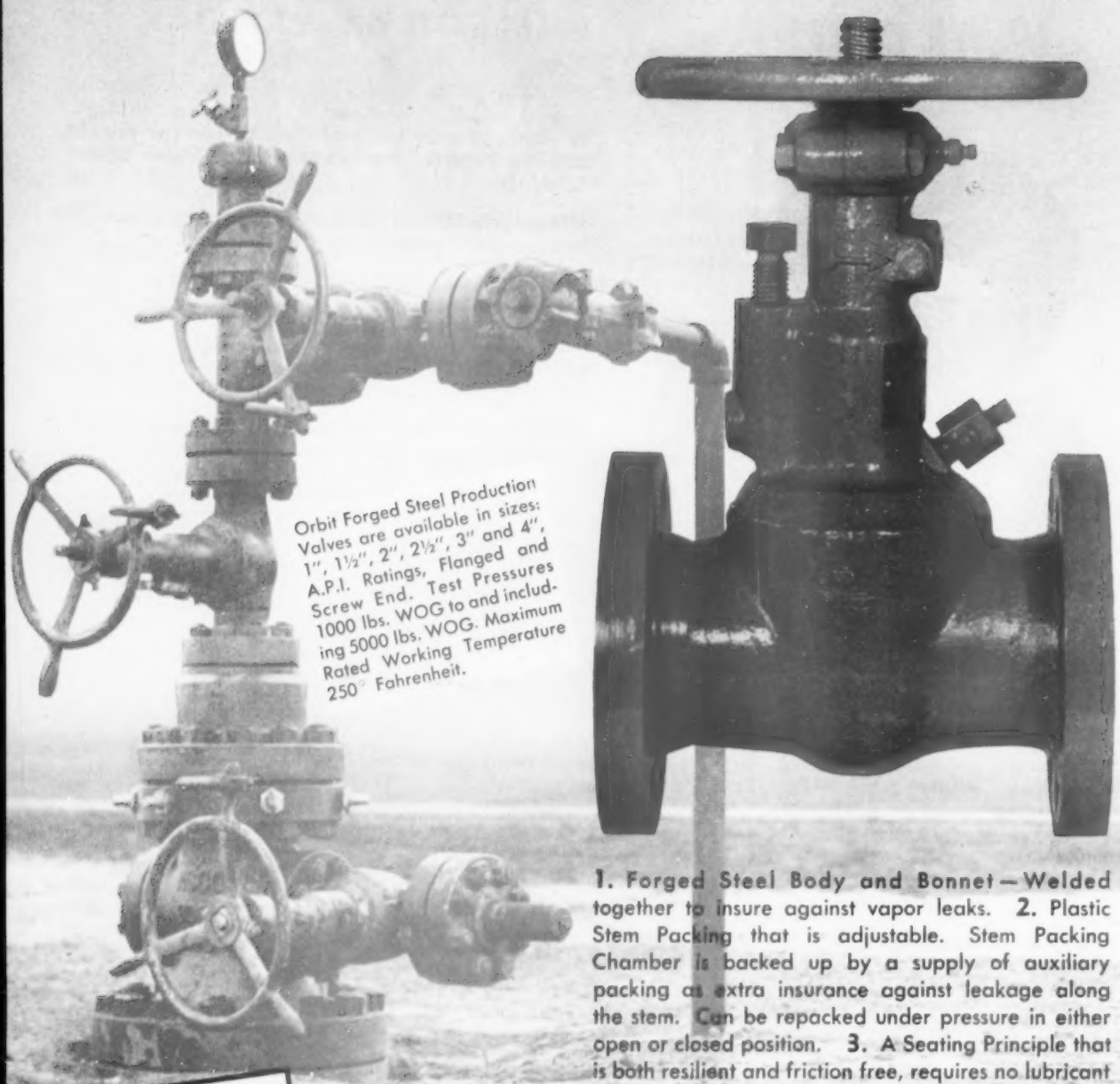

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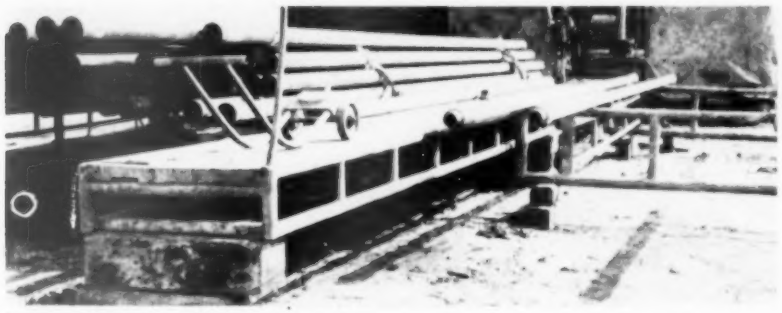

THIS WALK is compact, can be set at any height. It is used by Brack Oil Co. and is shown on location in Kansas.

Compact Pipe Walk

Built in two sections, it can be set at any height

BRACK OIL CO. supplies its rig No. 1 with a compact pipe walk which is built in two sections and which can be erected at any desired height by use of cribbing.

Three-inch pipe forms the top and bottom sills on each side, and short nipples set between them at intervals supply vertical braces.

Crossmembers at each end and at intervals between form the supports for three common, undressed 2-by-12 rig timbers for the floor. The floor is tied down to the supporting members with countersunken carriage bolts so the section, or sections, can be loaded on a truck, or unloaded without particular attention being given to the floor.

It was designed in a manner to be used at a rig, set on concrete piers high in the air; but if the floor of the rig is close to the ground, the walk and pipe rack may be laid on only one piece of timber as a ground support.

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Guides Position Mud Pumps

Forty-five-degree welding ells attached to the surface of the floor serves as guides in installing mud pumps into exact position.

In the installation shown here, the ground pad is faced with a steel plate so that attaching the ells offers no more difficulty than that of normal welding. Accurate measurements are made of the width of the mud-pump-

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The toughest corrosion problems in cooling water systems are readily controlled with Haering's Quachrom Glucosate*. Quachrom Glucosate* is constantly used in the Petroleum Industry to prevent unnecessary shutdowns due to waterside corrosion. Longer equipment life and lower maintenance costs result from Quachrom Glucosate* control. No other corrosion inhibitor can rival the long outstanding record of Quachrom Glucosate*.

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foundation sills, and the relation of the pumps to the floor and derrick positions. Ells are then welded, four to each pump, separated only enough so that the skid members will slip snugly into position.

When the pumps are lowered to the floor with a rigging crane, only one adjustment is necessary: Making the lineup for the "V"-belt drive.

VIEW OF one of the 45° ells used as guide in installing mud pumps into exact position.

FEDERATED METALS OFFERS NEW REPORT: "CATHODIC PROTECTION WITH ZINC ANODES"

Federated's Corrosion Advisory Service offers you, without obligation, a new report titled, "Cathodic Protection With Zinc Anodes," prepared by Ebasco Services Inc. for the American Zinc Institute. This new publication reports additional findings obtained since the first report was issued in November, 1951. In it you will find important and valuable facts that have influence on the proper applications of zinc anodes. Use coupon below for your free copy.

Zinc Anodes are available from Federated in standard lengths of 3 ft. and 5 ft. They are cast of Special High Grade Electrolytic Zinc in cross-sections of 2 sq. in. and 4 sq. in. Each has full length chemically-bonded steel core rod. Silver-soldered connecting wires can be attached if desired.

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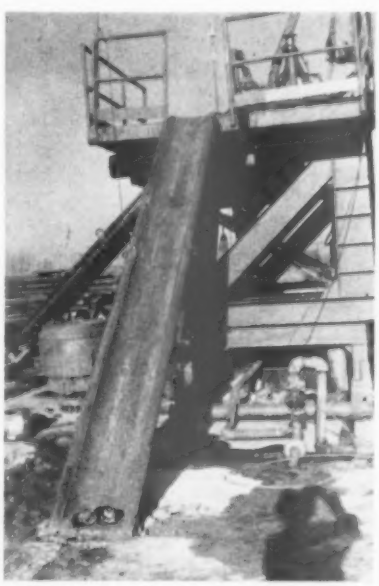
This Chute Used to Drop Tools, Bits Into Truck

A trough-like chute is being used by Coastal Drilling Co. at North Coles Levee, Kern County, California, to load tools onto a truck from the derrick floor, and to receive such material when delivered to the rig.

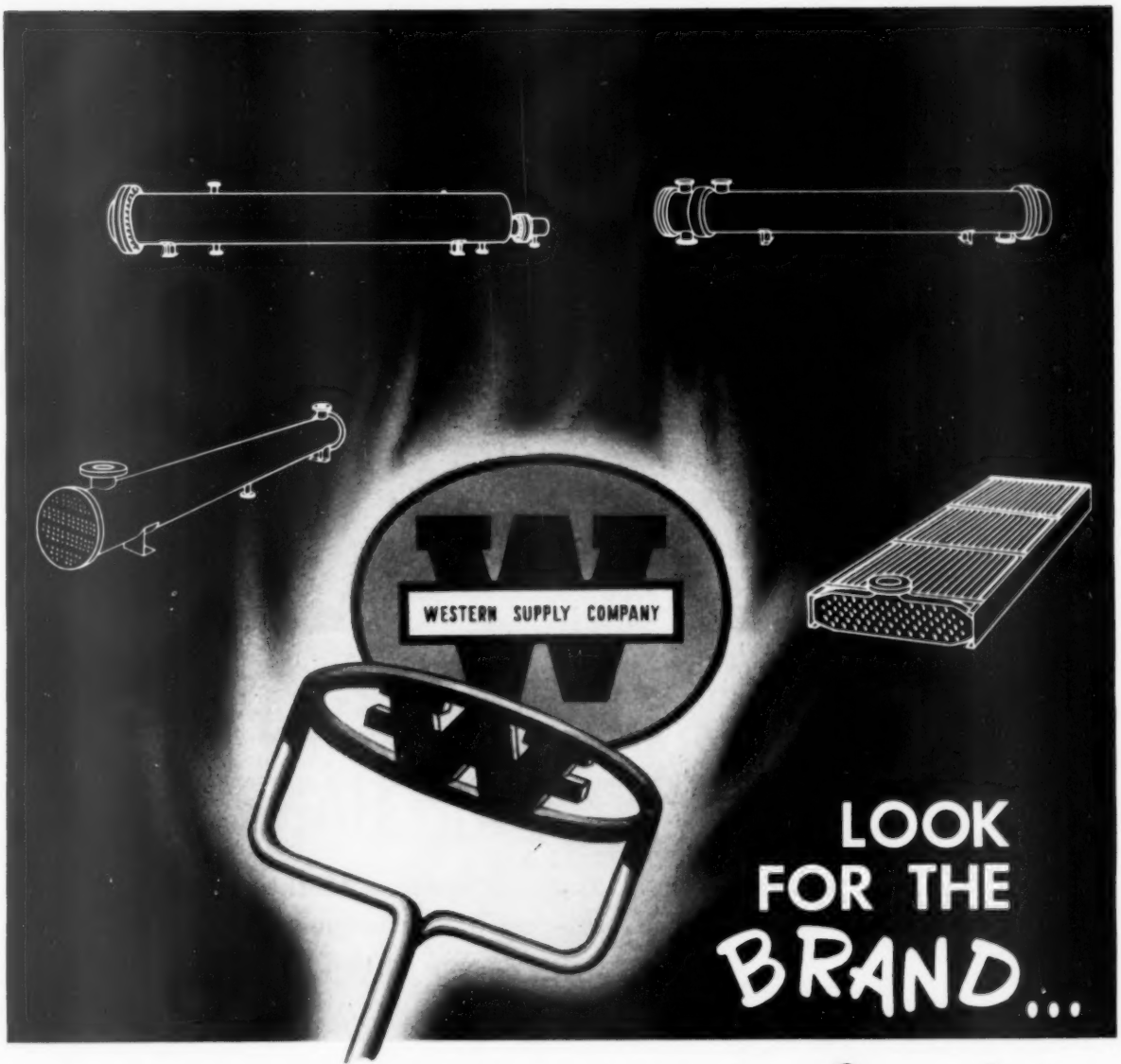
The chute has a frame of 2-in. pipe for rails on each side and the footing at the end, which sets on the ground. The floor of the chute is made by splitting light-weight pipe and welding on both sides to the pipe frame. Top of the chute has cleats to set on the edge of the floor to keep it in place while in use.

Ears, or loops welded on each side of the chute, provide means of attaching slings to handle when loading on a truck or setting up for use. When shipping tools from the rig, a deflector is set into the chute and anchored to the top set of loops, with the lower end resting on the floor of the truck body.

Tools and bits are passed down the chute into the truck where they are arranged for hauling. Unloading is done with a cat line, hooking onto the tool and bringing it into the derrick area without use of manpower for lifting.



HANDY CHUTE is used to drop tools, bits, and all kinds of small tools from the rig floor onto the back of pickup trucks. It has 2-in. pipe for rails on each side and footing at the end which sets on the ground. Floor of the chute is made of split light-weight pipe.



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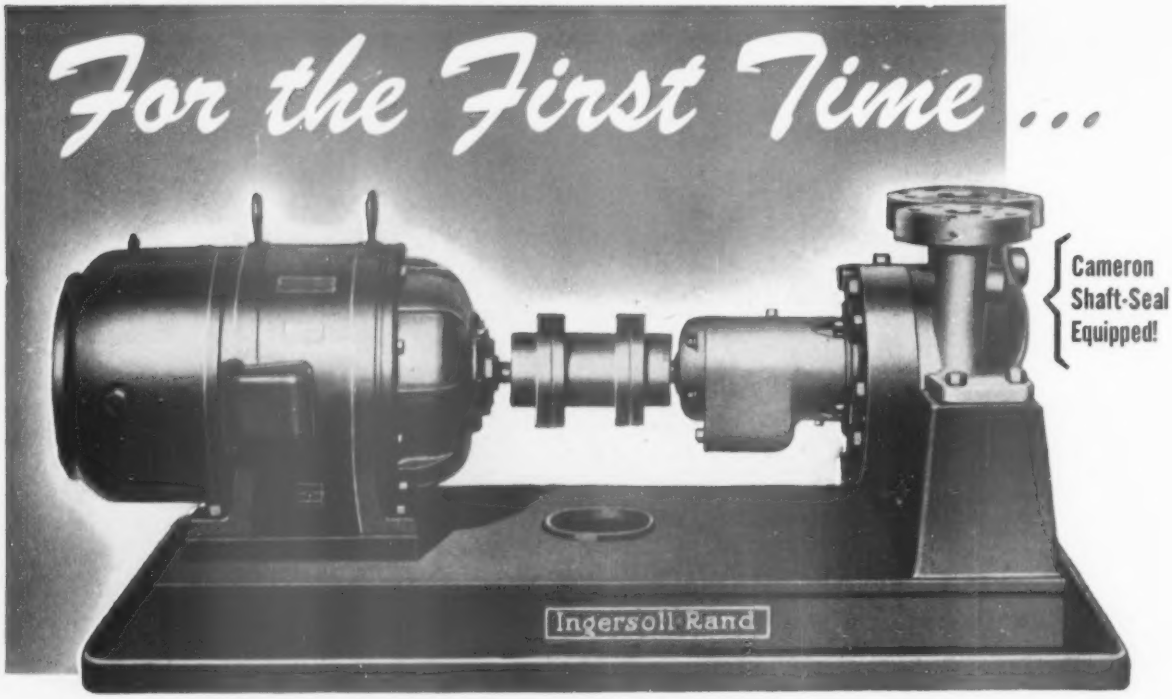
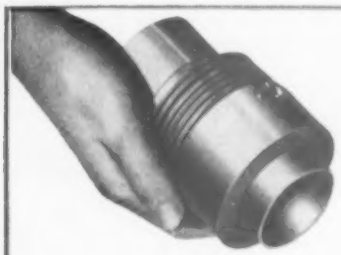


A REFINERY AND PROCESS PUMP DESIGNED AROUND A MECHANICAL SEAL



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A stationary sealing face of carbon and a rotating seal ring of stellited steel constitute the heart of the Cameron Shaft-Seal. Balanced sealing areas control contact pressure between the sealing faces, effectively preventing leakage without undue wear of the rotating fit. In difficult sealing jobs, the Shaft-Seal succeeds where complicated packed stuffing box arrangements have failed.

Built-in Cameron Mechanical Shaft-Seal reduces liquid losses and stuffing box maintenance in this SFLA pump line!

The Cameron Shaft-Seal is an Ingersoll-Rand development that has demonstrated its dependability in thousands of process installations the world over since its introduction in 1928. Now, this same Shaft-Seal is built-in as an integral part of these pumps—*at no extra cost*. Use of the Shaft-Seal efficiently stops liquid losses and reduces stuffing box attention to a minimum.

Designed for handling light refinery liquids at moderate temperatures, SFLA-MFLA-HFLA pumps are built in five sizes from 1 to 4 inches for low, medium and high head applications. Top discharge is standard, with top or end suction nozzles available. Capacities to 1000 gpm and pressures to 600 psi. Write, or ask your Ingersoll-Rand representative for full details.

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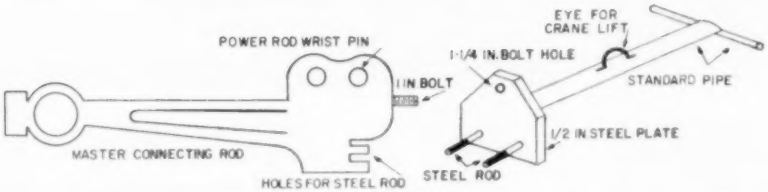

Rod Remover

Tool devised for removing engine connecting rods

A TOOL has been devised for removing master connecting rods from Cooper-Bessemer engines, Type GMV-T.

The task, which is normally a tricky and somewhat hazardous operation, may be done conveniently, safely, and without damaging engine parts.

A tool acts as a part-male, part-female plug, engaging portions of the existing connecting rod securely and is so constructed that once in position, a chain may be attached to an "eye" on the tool applying the necessary force to lift the connecting rod.

The tool (see drawing) consists essentially of two lengths of standard pipe welded at right angles to each other, with a steel plate welded to the end of the longest length of pipe.

In use . . . In using the tool, the lower half of the crank bearing is first removed and the two ¾-in. pipe-coupling guides on the tool are inserted in the two lock-bolt holes in the outer end of the master rod.

After the master rod has been lifted over the crankshaft, the chain from the crane is then hooked in the eye on the tool to remove the rod.

The method was suggested by Edwards W. Chambers, repairman for Humble Oil & Refining Co., Conroe, Tex.

Boiler Operation Improved

The addition of two new boilers at London, Tex., gas plant, of Humble Oil & Refining Co., called for a rearrangement of boiler controls to allow maximum use of the new units.

The new boilers were used in conjunction with nine older boilers with conventional system of fuel control by steam pressure. The desire was to have the new units take as large a per cent of the load as possible in order to relieve the older boilers.

However, the new boilers had a fuel system controlled by steam flow through an orifice and this led to serious fluctuation of boiler pressure in two separate boiler systems.

To counteract this situation, the flow controller across the orifice was partially taken out of service—now serving only as a recorder. A pressure controller was then placed on the fuel supply to the new boilers and they are maintained under constant conditions.

Meanwhile, the pressure load previously experienced by the nine older boilers has been lowered. Any variations in plant load may thus be easily absorbed by the nine boilers, which still have fuel supply governed by steam.

The method was suggested by William D. Gray, instrument maintenance man.

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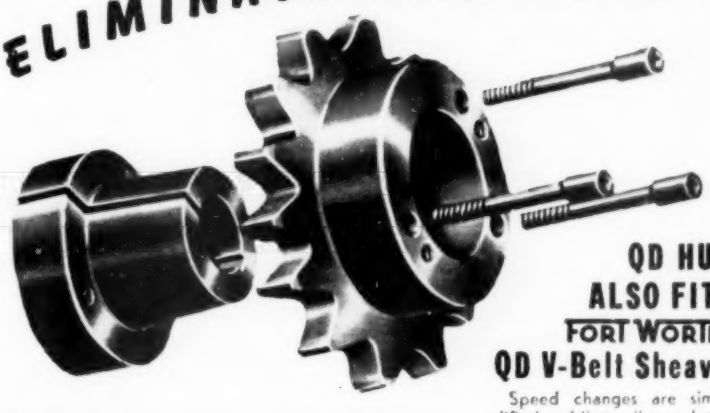
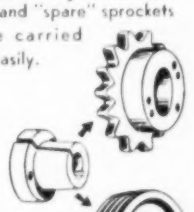


QD HUB ALSO FITS FORT WORTH QD V-Belt Sheave

Speed changes are simplified and "spare" sprockets can be carried more easily.



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Reboring of stock bore sprockets to fit various shafts is eliminated due to the various bores available in the QD hub. Installation and removal from the shaft is made easy by the tapered fit of the hub and sprocket. Hub assembly grips the shaft equivalent to a "press fit."

Replacement cost of sprockets is reduced as same hub can be used for new sprocket.

Catalog explaining additional advantages and construction details will be furnished on request.

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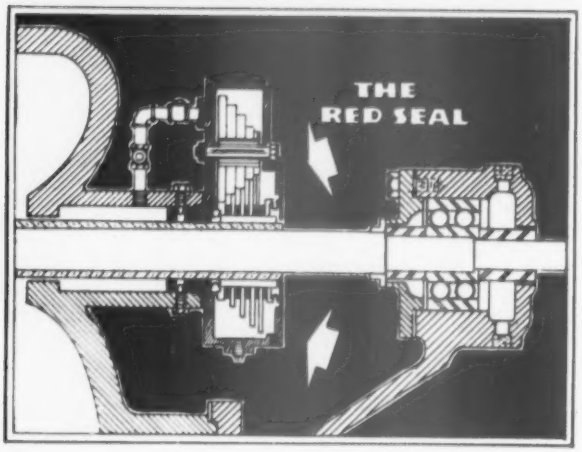
THE RED SEAL
PERFECTION SHAFT SEALING



The Design of *THE RED SEAL* Incorporates all of the Features that are Required to Make a Positive, Trouble-Free, Long-Life, Mechanical Shaft Seal for Rotating Equipment

THE Red Seal consists of a standard gear reduction which reduces the speed of each contact disc to 1/10th. that of the main shaft (giving long contact life). In addition to the positive speed geared discs, there are intermediate floating contact discs that theoretically reduce the speed between the geared discs by 50%. Since the stationary contact member is supported by a metallic diaphragm, all contact members are very flexible and shaft vibrations will not affect the contact life.

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4. All small static clearances that incrustation or foreign matter causes in activity are eliminated.
5. Seal Mechanism operates in Oil Bath and is completely independent of fluid being pumped*.
6. The Seal is ready made and convenient to stock.
7. The Shaft Sleeve Wall is thick enough to allow the customer to bore for many shaft sizes.
8. Easy to install, no renovating of equipment or replacing of shaft wear sleeve.
9. Completely pressure balanced.

*It is only necessary to use this separate lubrication method when you do not want your fluid being pumped to come into the seal housing. When pumping any fair lubricating commodity, the separation system is done away with and the pump stream is allowed to flow into the seal housing.

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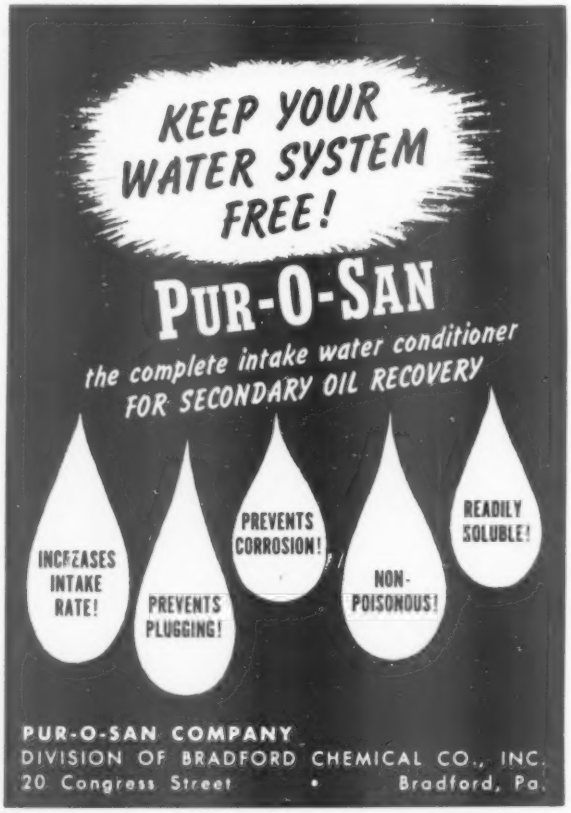

COMPRESSOR CALCULATIONS—5

Compressor Efficiencies

by R. W. Brooks*

AN efficiency factor E_k is employed to relate the theoretical horsepower and enthalpy change equations. Thus:

Isentropic Efficiency

$$= E_k = \int V\,dP/\Delta H = T.HP./\Delta H \quad (1)$$

For isentropic compression, the ratio should be unity; yet experience reveals that this is not the case. The E_k factors have been plotted on Fig. 1 of installment No. 4 *(The Oil and Gas Journal, May 11)*. The suction pressure has considerably more effect than the compression ratio at any given temperature. The efficiency factor, E_k, is a characteristic of the gas only and involves none of the fluid or mechanical friction losses of the compressor.

With every compressor there are additional machine inefficiencies due to valve losses and mechanical losses. Figs. 1 and 2, this installment, are plots of machine efficiencies for typical compressors.

Machine Efficiency

$$= E_c = \Delta H/B.HP. \quad (2)$$

*Pacific Gas & Electric Co. From paper presented at Pacific Coast Gas Association conference, Los Angeles, 1953.

The B.HP. values were taken from typical manufacturer's curves based on its experience as to the engine brake horsepower necessary for actual compression. The E_c curves are only approximate but they do indicate the trends and general magnitude of the compressor fluid and mechanical friction. Where actual compressor shaft horsepower data are available for a given compressor, the E_c plot may be established from Equation 2, and once determine it will be virtually independent of the natural gas compressed.

For a typical reciprocating compressor the over-all efficiencies (product of E_k and E_c) have been plotted on Fig. 2, this installment. These curves show the same general trend of the curve presented by Ridgway.[1]

The discharge temperature and Cp data are valuable for determining heat loads for cooling after compression. In these cases cooling is at a constant pressure so that an average Cp may be taken from Fig. 1 or 3, installment No. 3 *(The Oil and Gas Journal, May 4)* and the heat quantities calculated by the usual methods.

There are several advantages, especially in design work, in ascertaining the discharge temperature and horsepower requirements in the manner proposed in this series. The theoretical horsepower is easily calculated, and the maximum isentropic efficiency applying thereto can be easily determined from the curves. Various types of compressors may be compared as to machine efficiency. When adjusted by means of appropriate E_k and E_c values, the theoretical horsepower provides a ready means to obtain a design b.hp./M.M.s.c.f.d.

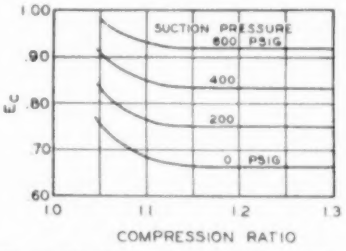

Fig. 2—Machine efficiency, typical single-stage centrifugal compressor.

Reference

1. Ridgway, R. S. Paper presented at C.N.G.A., Los Angeles, 1945, March 1 (The Oil and Gas Journal), May 12, 1945, p. 104).

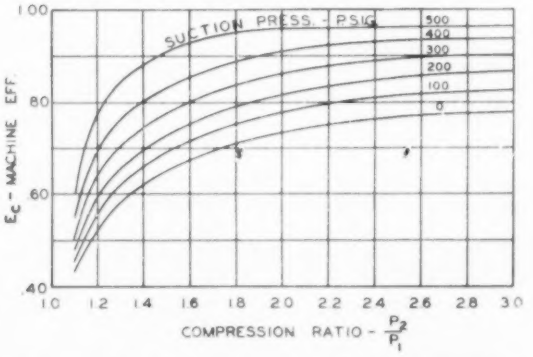

Fig. 1—Machine efficiency, typical reciprocating compressor.

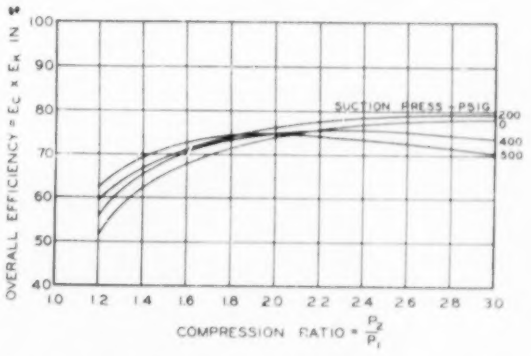

Fig. 3—Over-all efficiency for typical reciprocating compressor.

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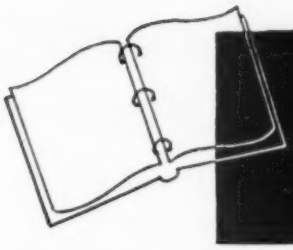

More on Military Specifications

by Dr. W. E. Kuhn*

AT the present time, the U. S. Government, principally the military services, has 297 specifications for petroleum products. If industrial concerns wish to keep up to date on the changes and use these specifications, it is necessary to devote considerable effort to keeping informed. This may be done both through the literature and through frequent contacts with government personnel. In addition, many of these specifications are in the process of change and new specifications are continually being written around products as they are developed. The Navy Cooperative Committee could perform a real service to industry if it would assume the responsibility of supplying each interested industry member with a copy of each new petroleum product specification immediately after issuance or upon revision. It would still be a welcome service, even if it were limited only to Navy petroleum specifications.

Qualification vs. inspection . . . Greases cannot be held in kettles for hours or compounded oils held in blending equipment blocking plant operations because of waiting for long-time tests to be completed. No refinery has storage facilities to conveniently hold specified shipments for indeterminate periods of time. Adequate inspection tests rather than full specification testing will resolve this difficulty. The practice of differentiating between qualification tests and inspection tests now in effect is not uniform. In the case of lubricating oils, for which an engine test is specified, such engine evaluation is normally accepted as a qualification test. This includes 36-hour engine tests. On the other hand, there seems to be a growing tendency, particularly in the case of the humidity cabinet test and certain grease tests, to require long tests of 100 hours' duration, or even more, as inspection tests.

From the manufacturing standpoint, another suggested improvement that could be made without departure from the objectives of the Navy of insuring quality and uniformity would be to modify the tolerance requirements. In the case of lot acceptance tests, the oils supplied are required to conform to the qualification sample analysis plus or minus certain tolerances. In the case of viscosity at 210° F., such tolerance is only plus or minus 3 per cent of the viscosity of the qualification sample. This can impose considerable hardship in supplying a qualification sample right in the middle of a viscosity range. It would seem expedient to eliminate these plus or minus variances from the qualification sample and rely solely on the range occurring in the specification, for example, 50 to 58 seconds S.U.s. at 210° F. with the understanding that both qualification sample and subsequent deliveries would fall within such range. This could apply to narrow sulfur tolerances permitted, which in some cases will prohibit the supplying an oil of low sulfur content. The viscosity and sulfur examples are given as typical. All properties of this type could well be based on a range given in the specification and made applicable both to qualification samples and delivery. Probably the most contested example of this tolerance limitation is in grease specifications where a plus or minus 20 points in penetration from the approval sample is demanded. Again the specification should establish the range, and both qualification sample and subsequent deliveries should fall within such a range. Even more illogical is the plus or minus 25° F. tolerance on dropping point. Specify a minimum and, if you get a much improved product, don't reject it.

Special or consolidated specifications . . . The many varied specifications issued by the Government on petroleum products is a subject that might well have a brief comment or two. From one point of view, it is a very fine objective to prepare specifications for all of the specialized requirements that may arise in military operation. During an emergency, the handling of a large number of petroleum products, and the assuming that the correct lubricant is used in the right piece of equipment, will present many problems. In fact, it might well be the case that the military could not procure an adequate supply of all the products at all times and have them at the necessary points when needed. Therefore, the question is raised, are there too many government specifications for specialized requirements?

It would certainly be a step in the right direction to reduce the number of lubricants actually required to a minimum and accomplish this by consolidation of specifications wherever possible. Plans should be made on the basis of anticipated conditions during an all-out emergency and not on peacetime or police-action status. The solution is not simple. The tremendous mechanized coordinated operation of the Navy is recognized, and simplification at the expense of performance must be avoided. Because consolidation of specifications is a complicated problem, this should not exempt it from consideration.

Navy experiment station . . . The Navy is to be congratulated on its expressed policy to approach all material development on a systems basis. The systems approach, as its basic principle, the consideration of all factors affecting operations and maintenance during the design and engineering periods. Fuel and lubricant requirements from the standpoint of design and performance are a part of this package assignment. From the inception of the device to the point where it is introduced into service, fuel and lubricants must be considered as a component part of it.

*Manager of technical and research division, The Texas Co. From talk given before the Navy Cooperative Committee.

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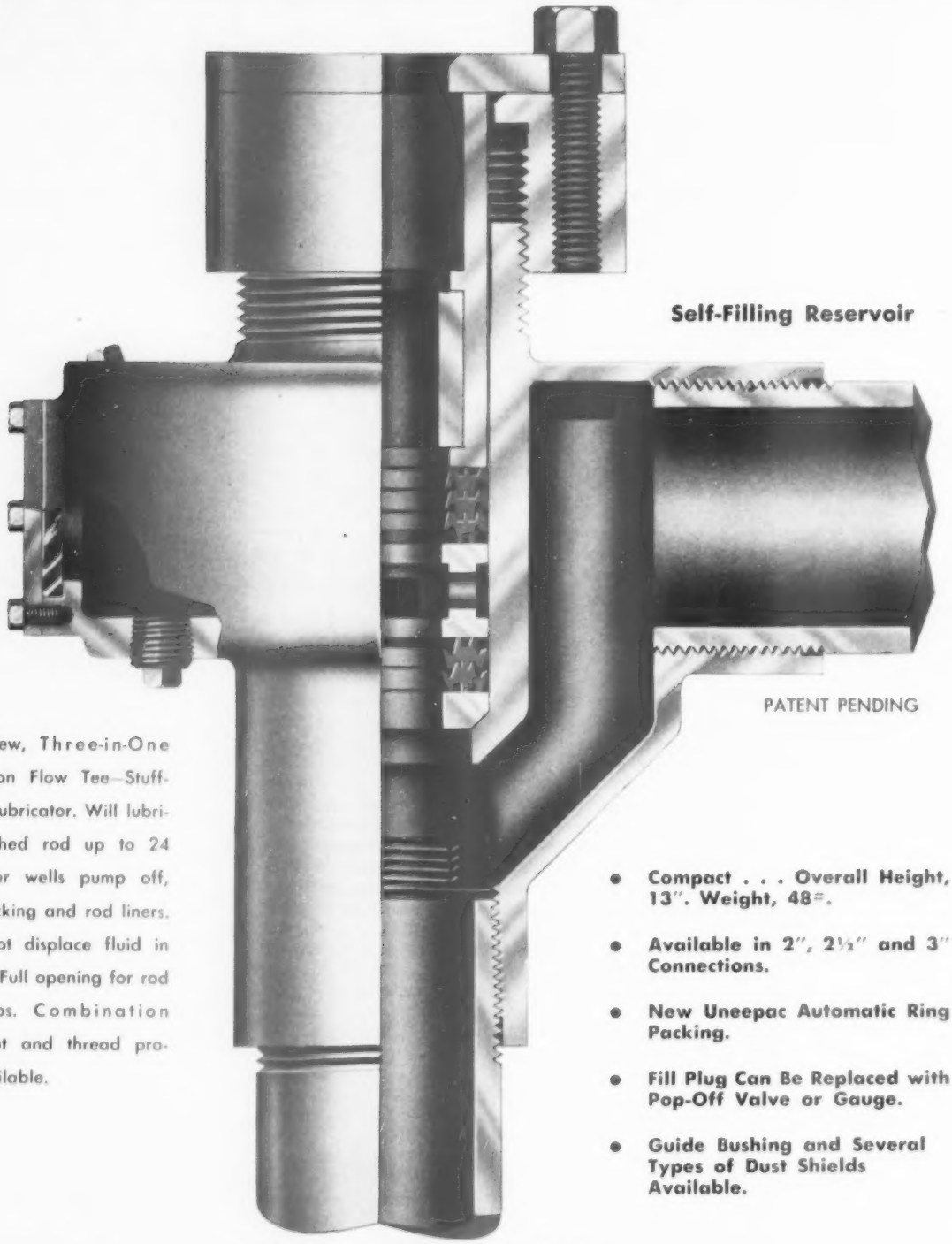

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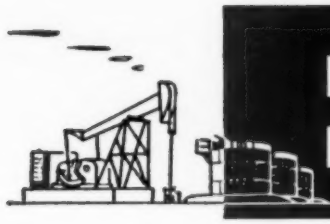

ENGINEERING FUNDAMENTALS

Air-Gas-Drive History for Noncommunicating Layers

by Ralph F. Nielsen*

IN many areas where field pressures have been allowed to decline to very low values during primary-production, secondary-recovery operations by air or gas drive have been started. The over-all picture of fluid distribution in an air-gas drive is quite different from that in a water drive. This is mainly due to the low viscosity of a gas as compared to that of water. In an air-gas drive there is very little "banking" of the oil. In a theoretical treatment, therefore, the natural simplifying assumption is that of uniform saturation between injection and producing wells. The gas-oil ratio at any time would then be given by the relative permeability and viscosity ratios.

Sometimes the formation consists of layers of varying permeabilities separated by shale breaks with little communication between layers. If all layers are exposed to the same air pressure in the input wells they will each have a separate "time schedule," depending on the permeability.

To illustrate the above theoretical approach we may consider a 200-ft. five-spot with an effective well radius of 10 ft., a sand porosity of 15 per cent, an initial oil saturation of 40 per cent, a constant water saturation of 30 per cent, an inlet pressure of 200 psi., and atmospheric outlet pressure.

The smoothed permeability profile is that shown in Fig. 1. The viscosity of the oil is taken as 3 cp. and that of the air 0.018 cp. The relative permeabilities depend on the saturations but it will be assumed that the water saturation is below the minimum for mobility and that the relative permeability ratio is given by:

$$k_g/k_o = 12^9 \times 10^{-12S} \qquad (1)$$

where S is the total liquid saturation. Values of k_g are given in Table 1. The five-spot formula gives approximately from the above conditions:

$$dq/dt = 10^3\, h\, K\, k_g \qquad (2)$$

*Associate professor, petroleum and natural-gas engineering, Pennsylvania State College.

where dq/dt is in cubic feet per day, h is the height in feet, and K the absolute permeability in darcies. Equation 1 may be used to find the amount of gas produced with a given amount of oil according to the theories. If the amount of gas is expressed in pore volumes at the mean pressure, integration of Equation 1 gives, for a viscosity ratio of 0.006:

$$V = 1/0.006 \int (10^9 \times 10^{-12S})\, d\,S \qquad (3)$$

Integration from the initial saturation to any lower saturation S_2 gives:

$$V = \frac{10^9}{2.3 \times 12 \times 0.006} (10^{-12S_2} - 10^{-9.4}) \qquad (4)$$

Barrels of oil and standard cubic feet of gas for a series of saturations are obtained from Equation 4, taking the pore volume of a 1-ft. thickness of the five-spot as 2,135 bbl. or 93,700 standard cubic feet of gas at a mean pressure of 100 psi. These calculated volumes are given in Table 1. The times required to obtain these volumes for a foot of 1-md. sand were calculated from Equation 2, graphically or by taking increments.

The production at any time must be integrated over the permeability profile. Since the initial saturation and relative permeability relations are assumed the same for all permeabilities, the values in the last column would give the times for a series of permeabilities if divided by those permeabilities. From this information a crossplot gives the series of "isochrons" shown in Fig. 2. These isochrons give cumulative productions per foot of sand at the given times and permeabilities.

The cumulative values Q_g and Q_o can be integrated graphically over the permeability profile. That is, another set of isochrons (not shown) are prepared, where Q_g and Q_o from Fig. 2 are plotted against values of h corresponding to the permeability profile. The areas under these curves give the total cumulative productions up to the times of the isochrons.

The calculated production history is shown in Fig. 3. Oil production is given as a fraction of that which could theoretically be produced if the oil saturation were reduced to that corresponding to zero relative permeability. This was taken as 50,000 bbl.

The air (gas) values shown in Fig. 3 are, of course, far beyond economic limits. While the above discussion illustrates the general theoretical approach, actual operation is more efficient than given by the theory. The assumptions of uniform saturation, uniform profile, and lack of vertical communication are not strictly valid. Also streaks of high permeabilities are usually set off by packers and driven at low mean pressures.

Reference

C. D. Stahl and R. F. Nielsen, Producers Monthly, August 1951.

TABLE 1—CUMULATIVE PRODUCTION PER FOOT OF SAND

S_2	k_g	Bbl. oil	M.M. std. cu. ft. air	T, thou. of days for 1 md.
0.70	0.20	0	0	0
0.68	0.26	42.7	1.57	9
0.66	0.32	85.4	4.25	19
0.64	0.38	128.1	9.02	33
0.62	0.44	170.8	17.7	57
0.60	0.49	213.8	33.3	90
0.58	0.54	256.2	60.0	145
0.56	0.58	298.9	103.8	238

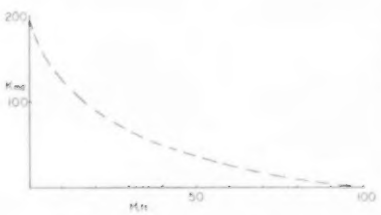

Fig. 1—Assumed permeability profile.

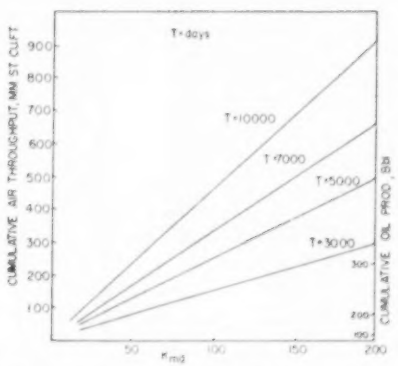

Fig. 2—Productions as a function of permeability at given times.

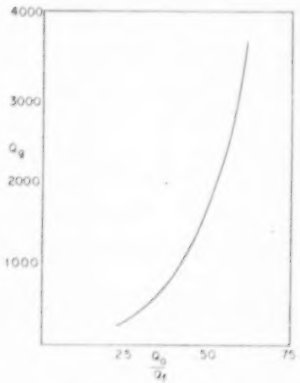

Fig. 3—Millions of standard cubic feet of air to produce a given fraction of the movable oil.

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QUESTIONS ON TECHNOLOGY

Cost of Handling and Firing Coal or Fuel Oil—1

by W. L. Nelson
Technical Editor

"We understand that oil can be fired much more cheaply than coal. What are proper costs for coal and for oil firing?"—P.G.

The cost of firing coal is very much higher than the cost of firing oil if the coal and ash are shoveled by hand, but in larger modern mechanized installations, the cost of handling coal is only about 16 to 60 cents per barrel (4.12 bbl. equals heating value of a ton of coal) greater than the cost of handling oil. The higher figure is based on an ideal situation in which only one type of firing equipment is installed, that is, burners for oil as against pulverizers (or stokers) for coal. It also includes about 10 cents per barrel due to the greater thermal efficiency that can be attained in oil firing. More often both installations are maintained, or at least the coal pulverizers (or stokers) must be maintained as a standby, and for such a situation the lower advantage of only 16 cents per barrel applies.

If the temperature is below freezing, coal must be thawed before it is unloaded. Portable thawing units are available for as little as $262, or for a cost of about $1,500 a thawing pit can be erected for each car hopper.[1] The portable units are gas fired but the thawing pits may employ coal as a fuel. Information is not available regarding the cost of this operation, but computations indicate a cost that is little more than 1-2 cents per ton.

After the car is unloaded or while it is being unloaded, a car shaker (minimum cost $1,700 but up to $12,000 for heavy-duty service) loosens the last particles of coal dust. Conveyors having a capacity of 25-50 tons per hour are used to carry the coal from the car to an elevator which lifts the coal either to a ground-storage chute, in coal bunkers or silos, or into storage silos. The horsepower required to lift 37 tons per hour through a height of 40 ft. at an over-all efficiency of mechanism, transmission, and driver of 25 per cent is:

$$\frac{37 \times 2{,}000 \times 40}{0.25 \times 33{,}000 \times 60} = 6 \text{ hp.}$$

The conveyors will also require power, so that at 1 cent per horsepower, the cost of power for these operations probably does not amount to more than 0.3 cent per ton. Somewhat similar operations are required in delivering the coal to the boiler room, but the total cost for power probably does not exceed 0.5 cent per ton. All of this discussion supposes that the coal is handled automatically or by means of mobile power-driven scoops. If manual shoveling is required at any point, the cost per ton of coal may mounts to $0.50-$2.00 per ton. For example, if one man handles only 1 ton of coal (1.2 cu. yd.) per hour, the cost is about $1.50 per ton.

Systems for small plants (under 5,000 tons per year, about 100 cars per year) may employ one of the following systems: (1) a monorail hoist system, (2) a lift truck, or (3) a continuous stoker feeder.

1. Monorail hoist ($600-$900 installed). The coal or ash buckets (700 lb.) on wheels are pushed to the coal or ash pile and either loaded by hand or by gravity flow from a bin. The car is then wheeled to the boiler or the ash dump and lifted and dumped by the hoist. An energetic fireman can handle the coal without a helper but in most plants a part-time helper is required. The cost of helpers (extra above fireman) for different sizes of plants is:[1]

Tons coal per year	Labor cost per ton coal based on $3,600 per man-year: 1 extra man	2 extra men	3 extra men
1,500	$2.40		
6,000	0.60	$1.20	
10,000	0.36	0.72	
15,000	0.24	0.48	$0.72
20,000	0.18	0.36	0.54
30,000	0.12	0.24	0.36

Thus, a half-time helper in a 5,000-ton plant would add about 25 cents per ton to the cost of handling coal.

2. Lift truck ($2,800-$3,300 or with pneumatic tires $3,700 for a 1,000-lb. car to $4,500 for a 2,000-lb. car). With the larger-size trucks, the fireman in addition to his regular duties, mounts the truck two or three times an hour and scoops coal from the pile and delivers it to the boiler, or transfers ash from the ash pit to the dump.

3. Bin to stoker feeder ($400-$750 per stoker not including storage bins). Simple enclosed conveyors either of the screw or flight type deliver the coal from the bins to the stoker hoppers.

More elaborate systems for larger plants involve silo storage bins with portable car unloaders, or under-track hoppers, or car shakers with or without automatic scales. The investments for these various systems[1] are indicated in Table 1. The retirement of these investments, payment of interest charges, and maintenance of the machinery amounts to fixed charges of about 15 per cent of the investment per year.

TABLE 1—TYPICAL ERECTED COSTS OF COAL AND ASH-HANDLING SYSTEMS[1]

Plant size (tons/year)	Handling equipment: Coal	Handling equipment: Ash	Silo capacity (tons)	Elevator capacity (tons/hr.)	Erected costs: Coal	Erected costs: Ash	Investment per annual ton of coal
300	Monorail hoist				$800		$2.67
2,000	Monorail hoist or bin				$800 to $3,700		Under $1.85
5,000	feeder or lift truck				$1,200 to $5,000		Under $1.00
6,000	Note (1)	Hoist	120	25	$14,000	$1,000	$2.50
9,000	Note (2)	Pneumatic	180	25	18,000	12,000	3.33
12,000	Note (2)	Pneumatic	240	25	20,000	16,000	3.00
15,000	Note (3)	Pneumatic	300	25	29,000	16,000	3.00
30,000	Note (4)	Pneumatic	600	50	42,000	23,000	2.17

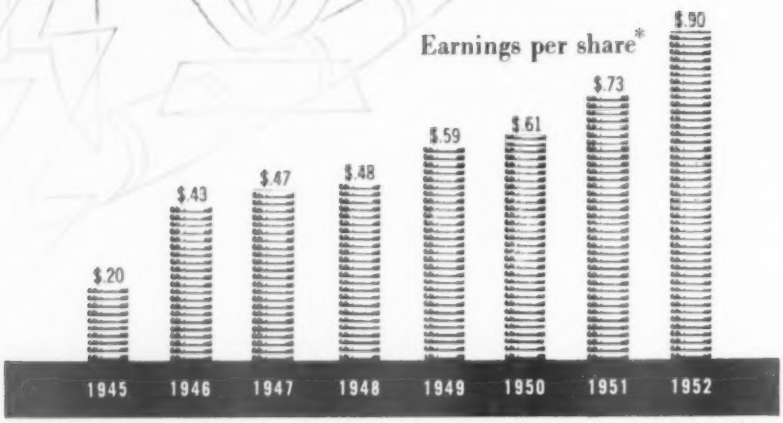
NOTES: (1) Silo system with portable car unloader, concrete-stave silo. (2) Silo system with undertrack hopper, concrete-stave silo. (3) Silo system with tile silo, car shaker. (4) Silo system with tile silo, car shaker, automatic scales.

Reference

1. Fairmont Coal Bureau, "Coal and Ash Handling," Bull. No. 14, Dec. 15, 1951.

Note: Additional discussion on this subject will be published on this page in subsequent issues.

Dramatic Evidence...



*Years prior to 1952 restated to give effect to stock split in 1952 and annual 3% stock dividends 1947-1952 inclusive.

The investor benefits from expansion only if there is an increase in *per share* earnings. It is this rather than just the trend in enterprise income which counts.

The **350%** increase in *per share* earnings of Citizens Utilities Company between 1945 and 1952 contrasts with a gain of **52%** shown by Moody's Index of per share earnings for electric utility companies in the same period. Between 1950 and 1952, Citizens' per share earnings increased **48%**; the Moody's Index for the industry shows **no gain** for this period. Citizens' per share earnings in 1952 were **23%** greater than in 1951, compared with an improvement of **7%** in the Moody's Index, representative of the industry.

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by W. L. Nelson
Technical Editor

Feasibility of Using Chromium and Chromium-Nickel Steels

THE additional cost of high-temperature or resistant alloy steels as compared with carbon steel must be justified by such factors as:

1. Oxidation corrosion resistance.
2. Strength at elevated temperatures.
3. Sulfide corrosion resistance.
4. Complicated equipment that represents much labor cost.
5. Maintenance labor and warehouse inventory.
6. Avoidance of shutdowns.

The approximate relationship among these variables is indicated in Fig. 1. This is based mainly on data published in the Progress in Metals issues of February 2; March 2; March 30; and April 27, 1953, and an examination of these sources indicate at once that there are great variations. The same data as those of Fig. 1 are also shown in Table 1.

It is clearly evident that the extra cost of alloy steels cannot be justified by considerations of sulfide resistance alone. The increase in cost is nearly always greater than the increase in resistance. However, if strength is significant as in pipe-still tubes or in tube hangers, the additional cost is always justified (see Table 1). Strength alters the situation because more of the metal thickness becomes available for destruction by corrosion. Thus, a 1-in.-thick carbon-steel tube that for strength must be only ½-in. thick, provides only a ½-in. thickness for corrosion whereas a 1-in.-thick 2 per cent chromium tube, which has a 50 per cent greater strength, provides ¾ in. of material for corrosion. Although the last columns of Table 1 seems to indicate that thinner walls are more profitable, note that only one-third to (about) two-thirds of the wall thickness contributes to the profit (or is available for corrosion) where in the center columns where the thickness is double that required by strength (of carbon steel) the thickness available for profit is one-half to three-fourths of the total wall thickness.

Strength alone cannot justify the greater cost of alloy steels except at very low percentages of alloy element or unless weight can thereby be saved, but oxidation resistance begins to justify alloy steels at even 4 per cent chromium, and at 13 per cent and higher chromium, the use of alloy steels is highly profitable. If strength is also a factor, then the use of even 2 per cent chromium steels is profitable.

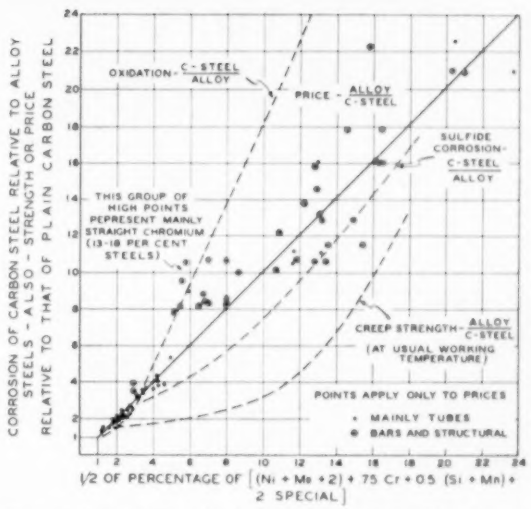
CORROSION OF CARBON STEEL RELATIVE TO ALLOY STEELS - ALSO - STRENGTH OR PRICE RELATIVE TO THAT OF PLAIN CARBON STEEL
OXIDATION - C-STEEL / ALLOY
PRICE - ALLOY / C-STEEL
SULFIDE CORROSION - C-STEEL / ALLOY
THIS GROUP OF HIGH POINTS REPRESENT MAINLY STRAIGHT CHROMIUM (13-18 PER CENT STEELS)
CREEP STRENGTH - ALLOY / C-STEEL (AT USUAL WORKING TEMPERATURE)
POINTS APPLY ONLY TO PRICES
MAINLY TUBES
BARS AND STRUCTURAL
½ OF PERCENTAGE OF [(Ni + Mo + 2) + 75 Cr + 0.5 (Si + Mn) + 2 SPECIAL]

Fig. 1—Approximate simple economic relationship between carbon and alloy steels used in refineries.

The cost of alloy steel bars relative to carbon steel bars can be approximated by the following formula (see Fig. 1):

$$\frac{\text{Cost alloy steel}}{\text{Cost carbon steel}} = \tfrac{1}{2}\,[2 + 0.75\,\text{Cr} + (\text{Ni} + \text{Mo}) + 0.5\,(\text{Si} + \text{Mn}) + 2\text{X}]$$

in which Ni, Mo, etc. = percentages of chemical elements, and X = special additions, as of titanium, columbium, selenium, copper, etc.

Tube materials cost about twice as much as bars and castings about 40 per cent more.

TABLE 1.—APPROXIMATE RELATIONSHIPS BETWEEN EXTRA COST AND EXTRA PERFORMANCE OF ALLOY STEELS USED IN PETROLEUM REFINERY STILLS

(Applies primarily to chromium and chromium nickel steels, some with molybdenum)

Number of times greater cost	Number of times better performance (than for carbon steel)								
		No strength required		Twice thickness required by strength of carbon steel			50 per cent greater thickness than strength of carbon steel required		
	Strength alone*	Oxidation	Sulfide corrosion	Oxidation only	Sulfide only	Oxide & sulfide	Oxidation only	Sulfide only	Oxide & sulfide
1.3	1.5	†**1.1**	†**1.3**	1.38	1.62	1.5	1.65	1.95	1.80
1.5	†**1.5**	**1.2**	**1.5**	1.5	1.87	1.69	1.8	2.25	2.02
2.0	**1.5**	**1.5**	**2.0**	1.87	2.5	2.19	2.2	3.0	2.62
3.0	**1.6**	†**2.7**	**2.8**	3.7	3.8	3.8	4.7	4.9	4.8
4.0	**1.8**	4.9	**3.2**	7.05	4.6	5.8	9.2	6.0	7.6
6.0	**2.0**	9.4	**4.4**	14.1	6.6	10.3	high	high	high
8.0	**2.5**	13.7	**5.8**	22.0	9.3	15.6	.....	.....	.....
10.0	**3.2**	18.1	**7.4**	30.6	12.5	22.2	.....	.....	.....
12.0	**4.5**	22.7	**9.5**	40.5	16.9	28.6	.....	.....	.....
14.0	**6.8**	48.0	**11.8**	high	22.0	55.5	.....	.....	.....
16.0	**9.7**	74.0	**14.3**	.....	27.2	high	.....	.....	.....
18.0	**13.4**	100.0	**16.8**	.....	32.2	.....	.....	.....	.....
20.0	**17.2**	high	**19.4**	.....	high	.....	.....	.....	.....
24.0	†**23.0**	.....	†**23.0**	.....	.....	.....	.....	.....	.....

*At customary temperatures, 900°-1,200° F. †Bold face indicate that the extra cost of alloy steel is not justified by the performance.

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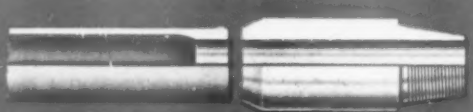
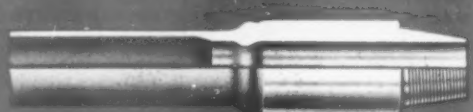
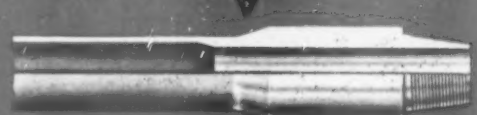


Prepared drill pipe and pre-threaded connector aligned for pressure-welding



Pressure-welded joint, showing upset metal

POINT OF PRESSURE-WELD



Upset metal is turned off and bored out to finish the pressure-weld joint. Arrow indicates point of pressure-weld

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Use and Care of Wire Rope—9*

. . . Alignment of Wire-Rope Carriers

GAGES made with the plus tolerances for wire rope should be used to measure the grooves. As shown in Fig. 1, gage should be in contact with the bottom of the groove through an arc of about 150°, when determining the proper sheave for the given rope or vice versa. If the gage does not touch the bottom of the groove as in Fig. 2, the groove will be too tight for a new rope. In Fig. 3, the gage rests loosely in the groove, and that groove would be too large for the rope in question.

GROOVE DIAMETER, TOLERANCES

Nominal rope diam., in.—	Recommended clearance in inches	
	Min.	Max.
¼ and 5/16	1/64	1/32
⅜ to ¾ incl.	1/32	1/16
13/16 to 1⅛ incl.	3/64	3/32
1 3/16 to 1½ incl.	1/16	1/8
1 9/16 to 2¼ incl.	3/32	3/16
2 5/16 and larger	1/8	1/4

*Taken from Bulletin 61, Use and Care of Wire Rope, A. Leschen & Sons Rope Co.

Alignment of Sheaves, Drums and Rollers

It is essential that all rollers, sheaves, and drums be in line in order to obtain maximum wire-rope economy, otherwise at the point of misalignment there is excessive wear. Sheaves out of line have been known to have one flange worn entirely off, which of course caused undue wear on the rope as well.

Drum Winding

Grooved drums are to be preferred to smooth drums. They provide better support for the rope and a more uniform winding. The groove pitch should be great enough to prevent one wrap rubbing against another. Some additional clearance may be provided for larger ropes wound in one layer. For multiple winding, however, it is important that the clearances be kept to a minimum so that the outer-layer windings can be better controlled. The suggested groove pitch for various diameter ropes is:

¼-¾-in.	Nominal diam. plus 1/32 in.
⅞-1⅛-in.	Nominal diam. plus 3/64 in.
1¼-1½-in.	Nominal diam. plus 1/16 in.
1⅝-2¼-in.	Nominal diam. plus 3/32 in.

The same care must be taken to keep the grooves smooth as in the case of sheaves. Occasionally the imprint of outer wires is seen. This should be ground out, or the wires of a new rope will suffer additional abrasion. Groove diameters should be about equal to the groove pitch.

Winding a rope on a drum tends to force the lay towards the end attached to the load. This produces a certain degree of rotation of the rope. On a smooth drum this results in open or close winding. If this is serious a change in rope lay may be indicated, although this will not correct every such condition.

Standard wire rope is made right lay and all new equipment designs should be based upon this fact. A left-lay rope is not readily available in all sizes, which will cause delay in securing replacements. A left-lay rope should only be used where a definite advantage results from its use, as on certain very high-lift clamshell installations. When standing behind the drum at the controls, and looking across the drum toward the incoming rope, a right-lay rope on an overwind drum tends to rotate towards the left and will therefore tend to close-wind against the preceding wrap if progressing across the drum from left to right, or to open-wind away from the preceding wrap if progressing across the drum from right to left.

Similarly on an underwind drum a right-lay rope rotating counterclockwise tends to move towards the right, and hence the tendency is to open-wind if the progression is from left to right across the drum, or to close-wind if the progression is from right to left. The opposite action takes place if the rope is left lay.

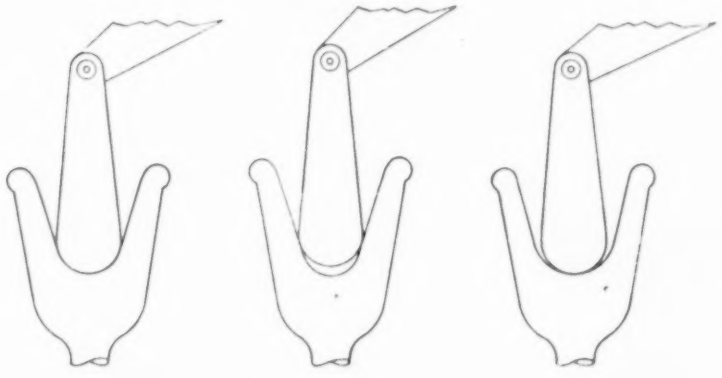


Fig. 1 Fig. 2 Fig. 3

GROOVE DIAMETER TOLERANCES . . . Gage should be in contact with bottom of groove, through arc of about 150°, when matching rope with sheave (left); if gage does not touch bottom of groove (center), groove will be too tight for new rope; if gage rests loosely in groove (right), groove will be too large for rope in question.

EQUIPMENT MEN . . . in the News

BJ Service, Inc., Appoints F. D. Smith Sales Manager

F. D. SMITH

John B. Merritt, executive vice president of BJ Service, Inc., a subsidiary of Byron Jackson Co., has announced the appointment of Frank D. Smith to sales manager for the BJ Service, Inc., Pacific Coast, Rocky Mountain, and Texas divisions. These three divisions cover the entire area of

C. F. McMAHAN

J. T. STREGER

BJ's oil-well service operations in the western states, Merritt stated.

Smith joined International Cementers,

J. D. ORMAND

O. O. LUTTRELL

Inc., a parent company of BJ Service, in September 1943 as Pacific Coast division sales engineer. He was promoted to division manager in charge of operations in January 1945. He was elected vice president in September 1950, and holds this same position with BJ Service.

Since his appointment, Smith has announced the following new appointments: C. F. McMahan as assistant sales manager; James T. Streger as Pacific Coast division sales supervisor; J. D. Ormand as West Texas division sales supervisor, and Orrie O. Luttrell as Rocky Mountain division sales supervisor.

McMahan joined Dowell Incorporated, in 1936, and transferred to International Cementers, Inc., when that company was formed in 1940. Streger was formerly BJ's Rocky Mountain division manager in charge of operations, and was with Pacific Cementing until I.C.I. was formed. Ormand joined BJ Service as sales engineer, having worked with I.C.I. in the same capacity since 1947. Luttrell was employed by Byron Jackson Co. in 1947 as a wire-line department sales engineer at Bakersfield, and was later placed in charge of sales and operations for that area.

Butler Obtains Controlling Interest in Union Tank

Butler Manufacturing Co., Kansas City, nationally known fabricator of steel buildings, welded tanks, bolted tanks, cleaners equipment, and numerous other metal products, has increased its stock holdings so that it now has the controlling interest in Union Tank & Supply Co. of Houston.

Union Tank has for several years been selling and erecting Butler bolted tanks in the Mid-Continent and Rocky Mountain area oil fields. The administrative offices of Union, a warehouse, and a manufacturing plant are located at Houston.

Donald E. Norquist, formerly with Butler, has been elected president of Union Tank. Norquist will direct the operations from Houston.

In addition to its administrative offices and plant at Kansas City, Butler operates manufacturing plants at Minneapolis, Minn.; Galesburg, Ill.; Richmond, Calif., and Birmingham, Ala.

B.S.&B. Appoints Bartley District Sales Manager

PAUL BARTLEY

Lawton L. Laurence, manager, oil-field sales, Black, Sivalls & Bryson, Inc., has announced the appointment of Paul Bartley as Lafayette district sales manager.

Bartley has been with B.S.&B. for the past 15 years. During that time he has served B.S.&B. as branch manager and assistant regional manager. In his new capacity, Bartley has supervision of sales and service activities of the oil-field division in the Lafayette sales district.

Vanderveld Made Branch Manager by Refinery Supply

Refinery Supply Co., of Tulsa, has announced the appointment of R. W. Vanderveld as Houston branch manager for its warehouse and office in Houston.

Vanderveld is a graduate of Michigan State University, majoring in chemistry, and he has many years' experience with Central Scientific Co., handling laboratory apparatus and equipment.

Mission Manufacturing Plans Addition to Houston Plant

Another addition is being made to the manufacturing facilities of Mission Manufacturing Co.'s plant in Houston. A new building containing more than 20,000 sq. ft. of space, and costing more than $100,000, is now under construction. The building will be used as a tool room and shop, and will contain special testing equipment. This is the second major addition to the Mission plant within the past year.

Web Wilson Oil Tools Opens Dallas Office

Web Wilson Oil Tools, Inc., has announced the establishment of Mid-Continent headquarters in Dallas, which will be in charge of Ray E. Gorman, Mid-Continent sales manager. The new headquarters are located in the Fidelity Union Life Building.

Leland Appointed By Delta Engineering Sales

John B. Leland has been named representative for Delta Engineering Sales Co., and Desco Service Co. and he will cover the states of Colorado, Montana, and Wyoming. His headquarters are located in Wheat Ridge, Colo.

Fluor Names Elizardi To Mid-Continent Area Sales

J. W. ELIZARDI

The appointment of J. W. Elizardi, Jr., as vice president in charge of Mid-Continent area sales for The Fluor Corp., Ltd., of Los Angeles, engineers, constructors, and manufacturers, has been announced by Mel Ellsworth, vice president and director of sales.

Elizardi, whose headquarters will be in Houston, was formerly Gulf Coast manager for The Marley Co. Before this he served for many years as vice president in charge of petroleum sales for The Griscom-Russell Co. in Dallas and Houston.

Lane-Wells Announces Supervisory Changes

Lane-Wells Co. has announced several supervisory changes in Louisiana, Mississippi, and Arkansas. J. G. Parker has been appointed subdistrict superintendent at Harvey, La., and transferred from Lake Charles, La. J. J. Kingrey will succeed Parker at Lake Charles, where he has been moved from New Iberia, La. W. R. Smith has been appointed subdistrict superintendent in New Iberia to fill Kingrey's former post. R. D. Fox, radioactivity operator in Natchez, Miss., will replace Smith as station operator at Laurel, Miss. T. A. Wintz, radioactivity operator in Natchez, has been transferred to the Gulf Coast division office in Houston as division field engineer. E. T. Robertson has been appointed subdistrict superintendent at Magnolia, Ark., and has been transferred from Harvey, La.

Drilco Oil Tools, Inc. Formed at Midland, Tex.

An announcement has been made of the formation of Drilco Oil Tools, Inc., of Midland, Tex., a consolidation of Morris & Blount Tool Co., Drilco Engineering Co., and Drill Collar Service Co.

Drilco Engineering pioneered use of sleeve-type stabilizers in straight-hole drilling and methods of increasing rates of penetration. Field inspection and other maintenance services of Drill Collar Service Co. will be continued and expanded. Morris & Blount Tool Co. has operated oil-field machine shops for many years, and these activities will be continued at Snyder and Midland, Tex.

The new firm will specialize on drill collars, subs, stub welding, tool joints, and other drill-stem work in addition to general machine-shop services. Hob mills are in operation at both shops.

Drilco service points are located at Hobbs, N. M., and Odessa, Tex. Machine shops are operated at Midland and Snyder.

Officers of Drilco Oil Tools, Inc., are, left to right: Moak Rollins, operations manager; Donald Morris, business manager; Stanley Moore, president; and Bill Bachman, sales manager. Kirth Elder, Snyder, Tex., shop manager, is not shown.

National Names Olson Sales Manager of Engine Division

C. K. OLSON

Charles K. Olson, Jr., has been named manager of sales for the engine division of The National Supply Co., Springfield, Ohio, in a series of advancements recently announced within the division. Olson had been assistant general manager of the division since November 1951.

Other advancements are: Robert M. Pearson, for the past 10 years manager of sales, has been named manager,

R. M. PEARSON

P. W. PLACE

Inland Marine Sales, for the engine division. Pearson has been with National Supply for 17 years.

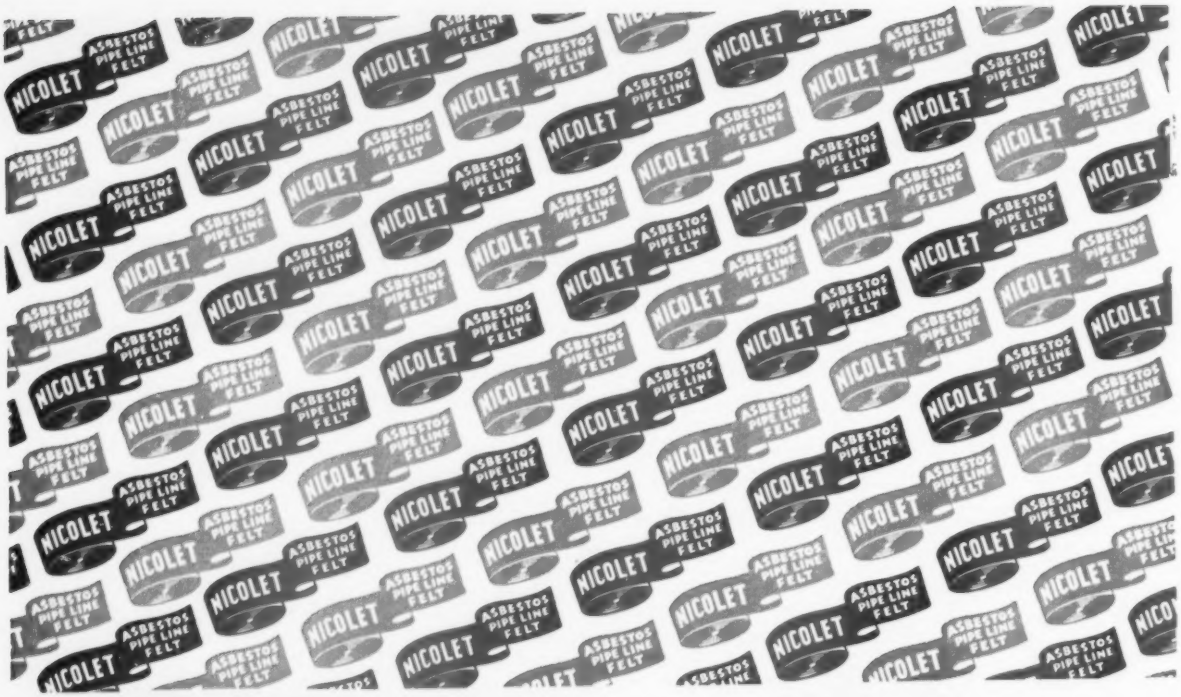
Philip W. Place, formerly staff assistant to the general manager, has been named assistant to the manager of sales, with responsibility for general service. He has been with the engine division since 1941, and has held a number of engineering positions within the division during that time. J. H. Newton, who joined National in 1948, has been named staff assistant to manager of sales.

Russell Appointed Service Supervisor for Dowell

Dowell Incorporated has announced through Ralph H. Smith, district manager at Midland, Tex., the appointment of Maynard W. Russell as service supervisor for Dowell in the Permian basin.

Russell has been with Dowell since early in 1948. He was first a service engineer at El Reno, Okla., but until his recent promotion has been at the company's general offices in Tulsa.

Russell's experience with Dowell has included 3 years as a development engineer during which his principal assignment was the development and field testing of Dowell's famous expendable glass gun and other work on the improvement of the shaped-charge method of perforating wells.



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PIPE LINES

Completion Record

10,000 miles of oil lines to begin operation in '53

WASHINGTON.—Oil pipe-line completions will set a new high record this year of nearly 10,000 miles costing $460,000,000, it is indicated on the basis of projects approved by the Petroleum Administration for Defense.

Projects approved by PAD for 1953 completion include 37 crude lines totaling 4,450 miles, 25 products lines totaling 4,500 miles, and 1,000 miles of crude-oil gathering lines. Fourteen projects already have been completed.

Twelve of the pipe lines will cost in excess of $10,000,000 each, and only 13 involve a cost of less than $1,000,000. The largest projects are as follows:

Lakehead Pipe Line Co.—465-mile, 30-in. crude line from Superior, Wis., to Sarnia, Ont., to have a capacity of 100,000 bbl. daily and cost $76,196,000.

Sinclair Pipe Line Co.—666-mile, 22 and 24-in. crude line from Drumright, Okla., area to East Chicago, Ind., already completed with a capacity of 280,000 bbl. daily at a cost of $52,000,000.

West Texas Gulf Pipe Line Co.—580-mile, 20 and 26-in. crude line from Colorado City to Nederland and Longview, Tex., already completed with a capacity of 300,000 bbl. daily at a cost of $39,672,000.

Rancho Pipe Line System—457-mile, 24-in. crude line from McCamey, Tex., to Houston, already completed with a capacity of 210,000 bbl. daily at a cost of $35,000,000.

Interstate Oil Pipe Line Co.—193-mile, 12 to 22-in. crude line from Shreveport to Baton Rouge, to have a capacity of 133,000 bbl. daily and cost $10,020,000.

Buckeye Pipe Line Co.—291-mile, 8 to 14-in. products line from Allentown, Pa., to Syracuse and Caldonia, N. Y., to have a capacity of 50,000 bbl. daily and cost $22,835,000.

Inland Empire Pipe Line Co.—504-mile, 10-in. products line from Billings, Mont., to Spokane, Wash., to have a capacity of 9,000 bbl. daily and cost $17,962,000.

Wolverine Pipe Line Co.—300-mile, 16-in. products line from East Chicago,

They Don't Come Any Bigger

This huge 26-in. scraper is used in cleaning operations along the entire length of the recently dedicated $42,000,000 West Texas Gulf crude trunk from Colorado City, West Texas, to Nederland, Tex., in the Houston refining area on the Gulf Coast. The line and the scraper, shown at West Texas Gulf's Ranger Station, are the biggest in crude-oil service in this country. The 577-mile trunk and a 112-mile, 20-in. spur from Wortham, to Longview, Tex., were dedicated officially May 12. The line's ultimate capacity is 440,000 bbl. daily.

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Ind., to Detroit and Toledo, to have a capacity of 95,000 bbl. daily and cost $15,450,000.

Continental Pipe Line Co.—593-mile, 8-in. products line from Billings to Spokane, to have a capacity of 14,000 bbl. daily and cost $14,150,000.

Evangeline Pipe Line System.—194-mile, 16-in. products line from Port Arthur, Tex., to Baton Rouge, to have a capacity of 96,000 bbl. daily and cost $12,900,000.

Standard Oil Co. (Ind.)—243-mile, 10 and 12-in. products line from Whiting, Ind., to River Rouge, Mich., to have a capacity of 49,000 bbl. daily and cost $11,545,000.

Standard Oil Co. (Ind.)—316-mile, 12-in. products line from Sugar Creek, Mo., to Dubuque, Iowa, already completed with a capacity of 40,000 bbl. daily at a cost of $10,210,000.

Huge Gulf Interstate Gas Line Approved by FPC

NEW YORK.—Gulf Interstate Gas Co. has been issued a certificate by the Federal Power Commission, authorizing construction of a system which will consist of 860 miles of 30-in. natural-gas transmission line from Acadia Parish, Louisiana, to Boyd County, Kentucky, plus gathering lines and laterals.

At press time, the certificate was in transit to Gulf Interstate. Management of the company, bankers, and insurance companies as yet had no chance to examine it. There is every indication that construction will be under way in July.

The 860-mile trunk line to Kentucky will be laid by H. C. Price Co. and Houston Contracting Co. More than 230 miles of gathering line will be laid by Associated Pipe Line Contractors, Inc., Anderson Brothers Corp., and Williams Brothers Co.

El Paso May Transmit Utah Gas to California Market

EL PASO, Tex.—El Paso Natural Gas Co. revealed last week that it is considering building a line through which natural-gas production in Utah, in excess of that state's market requirements, would supply part of the huge California market.

The company recently opened an office in Salt Lake City and has acquired the right to explore for and develop gas on more than 200,000 acres of leases in the state. Company officials said the negotiations are now going on aimed at acquiring more acreage.

El Paso entered Utah late last year when the firm acquired two-thirds or

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100,000 shares of the common stock of Utah Natural Gas Co. Late in April of this year, the Utah Public Service Commission granted Utah Natural a permit to lay a 63-mile, 18-in. gas-transmission line from Clear Creek field to Provo, Utah. The line will have a capacity of 120,000,000 cu. ft. daily, of which 100,000,000 cu. ft. daily will be turned over at Provo to Mountain Fuel Supply Co. for distribution in Provo and the Salt Lake City area. Initial deliveries will be 50,000,000 cu. ft. daily.

Utah Natural has executed contracts with Three States Natural Gas Co. and others for the line's gas supply from Clear Creek. The contracts stipulate that gas reserves in excess of the Utah requirements will be made available to supplement service to California.

Standard's New 309-Mile Line Goes in Operation

CHICAGO.—Standard Oil Co. (Ind.) has completed and placed in operation its new 309-mile, 12-in. products pipe line from Sugar Creek, Mo., to Dubuque, Iowa.

Capacity of the line is about 40,000 bbl. daily. The new system connects Standard's Sugar Creek refinery, near Kansas City, with the Dubuque pipeline terminal on the company's present products line from Whiting, Ind., to Moorhead, Minn.

R. F. Pielsticker, temporary general manager of crude-oil supply and products pipe lines said products lines now operated by Standard are located in seven midwest states. The line increases the total line mileage to 1,731, he pointed out.

Plantation Lets Contract For Greensboro Extension

BATON ROUGE.—Plantation Pipe Line Co. has let contract for construction of 82 miles of 14-in. products line between Charlotte and Greensboro, N. C., to Anderson Brothers Corp., Houston.

M. E. Grant, vice president of Plantation, said the new line, together with related facilities, will cost approximately $4,500,000.

Construction operations are scheduled to begin by June 15, and completion of the project is due the latter part of the year.

The new line is the final segment in a construction program involving paralleling of the entire Plantation system from Baton Rouge to Greensboro. The common-carrier system carried products under regulations of the Interstate Commerce Commission.

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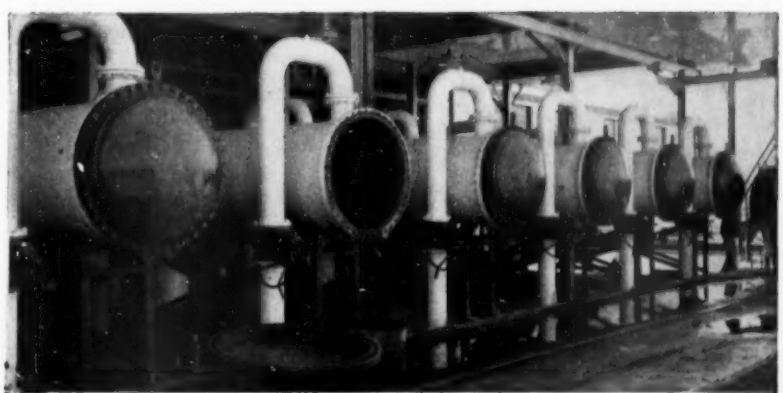

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REFINING

Most Organics to Be Made From Oil, Chemists Told

CHICAGO.—Most of the organic chemicals now marketed will later be made from petroleum, Dr. Gustav Egloff, director of research for the Universal Oil Products Co., predicted before the thirty-ninth midyear meeting of the Chemical Specialties Manufacturers Association at the Drake Hotel here May 18.

Egloff cited the fact that thousands are already so based. He said "the possibilities are almost limitless when one considers that there are now 600,000 organic compounds, and, in a few years, there may be over a 1,000,000. Not only are new chemicals continually being introduced, but new specialty applications are being found for products already in use."

Epon resins . . . As an example, he cited the epon resins, which, used primarily for primers and floor varnishes, have also been applied to a variety of fields such as baking finishes and can coatings.

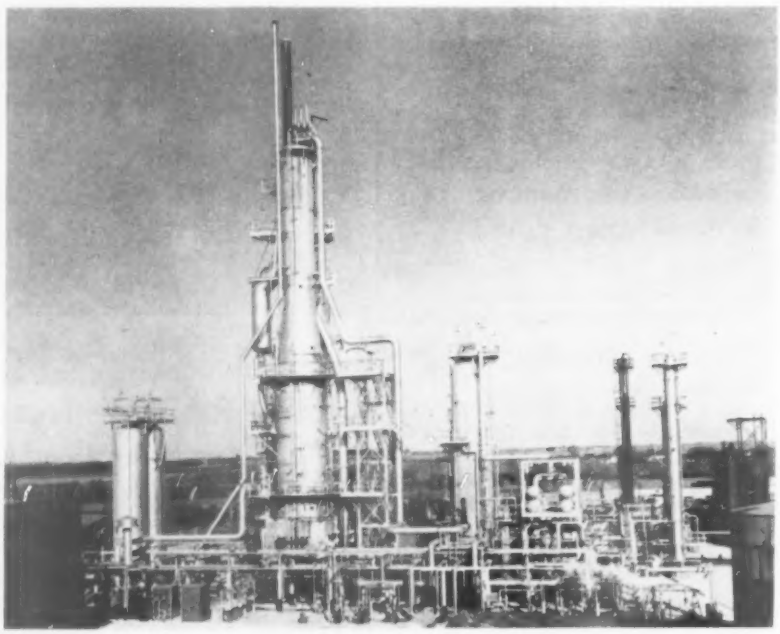
Among the outstanding new products with a wide range of possible applications is Hypolon, a chlorosulfonated polyethylene rubber. This product is completely resistant to ozone, has good resistance to abrasion, weather, heat, and crack-growth. It is particularly applicable to such products as weather stripping, garden-hose covers, radiator hose, and wire and cable covering. It can be blended with other rubbers and made into tire treads without carbon black.

Agencies Report Drop in Refining Profits in 1952

WASHINGTON.—Profits of refining corporations last year were 16 per cent less than in 1951 before taxes and 5 per cent less after taxes, the Securities and Exchange Commission and Federal Trade Commission report.

In a joint survey the two agencies found that petroleum refiners' profits in 1952 amounted to $2,668,000,000 before taxes and $2,009,000,000 after taxes. In 1951 profits were $3,180,000,000 before taxes and $2,105,000,000 after taxes.

A study of corporations engaged in manufacture of other products from petroleum and coal showed a drop of 24 per cent before and 23 per cent after taxes. Before-tax profits dropped



New Catalytic Cracking Facilities

Now in operation at El Dorado Refining Co.'s refinery at El Dorado, Kans., is this new 4,600-bbl. T.C.C. unit, shown with vacuum still and polymerization plant. The refinery has a charge capacity of 12,000 bbl. daily. Polymerization capacity is 1,000 bbl. daily.

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MAKE NIGHT HOURS PAY with this flexible light and power unit. Four corner-mounted, 80,000 C.P. flood lights raise to 31½ Ft. and aim in all directions. Control panel has duplex receptacles for lines to extension lights and power tools — voltage regulator circuit breaker. Tow at highway speeds on any dump trailer with leaf springs and retractable caster wheels. This is the finest, most adaptable unit on the market. Dependable, low cost 300 to 10,000 watt gas electric plants also available.
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from $103,000,000 in 1951 to $78,000,000 last year, and the net after taxes declined from $47,000,000 to $36,000,000.

Sunray Plans New Coking Unit at Duncan Refinery

TULSA.—Sunray Oil Corp. revealed last week it is considering constructing a new coking unit.

The 6,000 to 9,000-bbl. per day coking unit would be constructed in connection with the firm's catalytic cracking unit at Duncan, Okla.

Indiana Standard Plans Whiting Paraxylene Plant

WHITING, Ind.—Standard Oil Co. (Ind.) has announced plans to construct a plant at its refinery here to manufacture paraxylene. Construction will begin soon, and completion is expected by January 1, 1955.

Production at the new plant is anticipated at 14,000,000 lb. annually. Badger Manufacturing Co. is engineering the unit.

Paraxylene is an aromatic hydrocarbon which heretofore has been obtained largely from coal tar. Its principal use is in the manufacture of the new synthetic polyester fibers and polyester plastic film.

Refining Briefs

FINDLEY, Ohio.—Ohio Oil Co. expects to complete the new 5,000-bbl. per day coking unit at its Robinson, Ill., refinery by July 1, J. C. Donnell, II, president, told stockholders at their sixty-ninth annual meeting here recently. An 8,000-bbl. per day catalytic reforming unit is scheduled for completion at the refinery by January 1, 1954, Donnell said.

PHILADELPHIA.—Atlantic Refining Co. is contracting with H. K. Ferguson Co. for construction of a 7,500-bbl. per day catalytic reforming unit at is Atreco, Tex., refinery. Completion of the company's 12,000-bbl. per day unit at Philadelphia is expected in August.

DICKINSON, N. D.—Queen City Refinery, Inc., has purchased land for a refinery here. The new unit will be built on a 68.9-acre plot purchased from the State Board of Higher Education for $11,900. Chester Brooks, who recently was named manager of the plant, will direct construction.

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Among the Drilling Contractors

New Drilling Firm Formed To Operate in California

J. H. Casey, formerly drilling superintendent for Miller & York, Bakersfield, Calif., and R. B. Montgomery, formerly with Thomas B. Pike Drilling Co., Los Angeles, have organized the contracting firm of Casey & Montgomery. The firm is starting with a new rotary rig for contract drilling to depths around 5,500 ft. It has offices in Bakersfield and at Studio City.

Shreveport Area Gets New Contracting Firm

P & F Drilling Co. is a newly organized contract-drilling firm operating in the Arkansas-North Louisian-East Texas area. Partners in the ownership are Jim M. Findley, formerly with Nowery Drilling Co., Shreveport, and Ben Propst of Concord, N. C. The new firm, headquartering in the Shelby Building, Shreveport, will operate medium to large power rigs.

Casa Grande Drilling Co. has a rig working for South Texas Oil & Gas Co. and Trimark Oil Co. at a wildcat location 1½ miles northeast of the abandoned Navidad gas field in Jackson County, South Texas. The test, 1 McClure, is projected to 5,000 ft.

L & W Drilling Co. and **Clark Fuel Producing Co.** are the contractors on two new 2,000-ft. tests starting in the El Tangue area, 3 miles east of Rio Grande City, in Starr County, Southwest Texas. The former is drilling for Bass & Vessels at 1 Baird et al., a mile north of the abandoned El Tangue field. The other is drilling for Owen & Moss at 1-D Ricably estate, a mile south of the field.

WMW Drilling Co. will drill a 3,500-ft. test for Wymore Oil Co. at a wildcat location 4 miles east of Beeville, in Bee County, South Texas. Location is for 1 Ellis. It is in the J. Hood Survey, and is about a mile southeast of the Diebel field.

J & C Drilling Co. has taken a contract for another wildcat test which Arnold O. Morgan proposes to drill on his R. H. Welder lease in the Portilla area of San Patricio County, South Texas. The new test, 2-F Welder, located 1½ miles northeast of 1-F Welder, an 8,020-ft. dry hole, is projected to 8,500 ft.

J. B. Vassey is drilling a 5,000-ft. test for Pontiac Refining Co. on the latter's Little lease 7 miles east of Oakville, in Live Oak County, South Texas. Location is in the J. Ward Survey 330.

Guffey Drilling Co. is under contract to Hugo Allen and Cosden Refining Co. for a 5,000-ft. wildcat test, 1 Steinmyer, located 2 miles southwest of production in the Tynan field, in Bee County, South Texas. Location is in the Refugio County School Lands Survey.

Continental Drilling Co. has a contract with Kerr-McGee Oil Industries, Inc., for another deep wildcat test to be drilled in the Breton Sound region of Plaquemines Parish, Louisiana. The new operation is 1-F State Lease 1237, in Block 45. Contract is for 10,000 ft.

Marshall R. Young is the contractor on Union Producing Co.'s latest operation in the Muldon gas field, in Monroe County, in the Black Warrior basin, northeastern Mississippi. The new well, 1-A Plant Unit, fourth for the field, opened in 1952, is nearly a mile east of the discovery producer. Hole is projected to 5,700 ft.

Associated Well Service Co. is the contractor on a projected 6,000-ft. test which Southwest Natural Production Co. of Shreveport is starting in Fausse Pointe area of Iberia Parish, Coastal Louisiana. Location is for 1 J. D. Broussard heirs in 26-11s-8e.

Hinkle Drilling Co., Houston, is drilling for Southern Natural Gas Co. at a wildcat location a mile south of Franklin, in St. Mary Parish, Louisiana Gulf Coast. The test is carried as 1 Placito Tamporello. Location is in 37-15s-9e.

Rowan Drilling Co., Fort Worth, has contract for Amerada Petroleum Corp. 1 L. W. Ward, 11-13s-38e, Lea County, New Mexico. Projected depth was 12,000 ft. Location is in the new Bronco-Devonian field.

Johnson Drilling & Service Co., Magnolia, Ark., contractors on the discovery well of new West Midway field in Lafayette County, southwestern Arkansas, have contract for Sunray Oil Corp.

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we're already drilling straight, fast, full-gauge hole with H. C. SMITH ROCK BITS"

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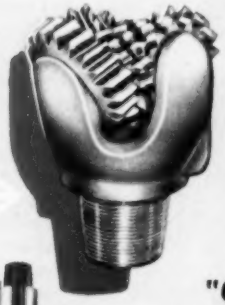

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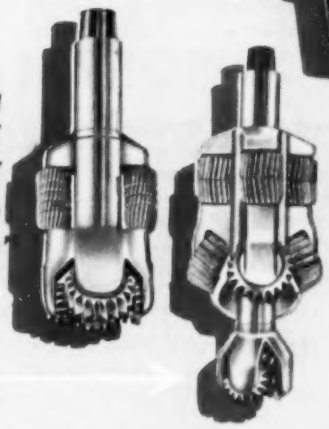
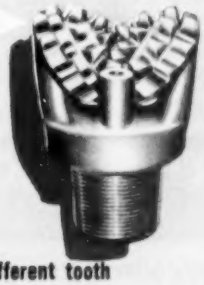


"Other times 2-CUTTER BITS are best for the job"



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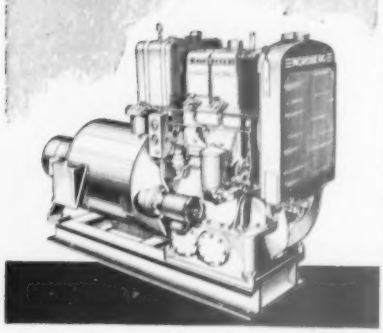

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1 G. Crank, 100 ft. south of C SW SE 7-15s-24w, due north of the recently completed confirmation well to West Midway field. The 1 Crank will be a Smackover lime test.

Parker Drilling Co., Tulsa, has contract for Western Natural Gas Co. 1 Millard Eidson, 14,000-ft. Lea County, New Mexico, wildcat in 35-16s-35e. Location is southwest of a recent Devonian discovery.

Dorris Ballew, Inc., will be contractor for John S. Callon and F. H. Shortridge 1 U.S.A., 660 ft. from south and east lines in Section 29-5n-1w, Wilcox wildcat in Adams County, Mississippi. The test will go to 7,000 ft. The new wildcat is located about ¾ mile southeast of Courtland field production.

Wayne Gossett is drilling on a new contract he has with Producers Corp. of Nevada for a 3,000-ft. wildcat test, located 3 miles west of Stockdale, in Wilson County, Southwest Texas. The test, 2 McDaniel, is the second for the operator on the lease, the first being a dry hole. Location is in the Charles Patton Survey 4.

Lavaca Drilling Co. has a new operation under way in the Higgins field, Wilson County, Southwest Texas, where it is contracting for W. J. Rasnick. It is 1 Kate Higgins, to which the rig has been skidded from 1 Hasse, ¾ mile southeast, now testing for completion. Contract is for 6,500 ft. The field is 11 miles southwest of Floresville.

Longhorn Drilling Co., San Antonio and Three Rivers, Tex., has a contract with Max Pray of Chicago for a 5,000-ft. test, 1 Banker, at a wildcat location 6½ miles northwest of Orange Grove, in Jim Wells County, South Texas. Location is in the J. Pointevent Survey.

ACTIVE ROTARY RIGS*

Area—	Week ended 5-18-53	Change week ended 5-11-53	Change week ended 5-19-52
Gulf Coast	624	+15	— 17
N. & W. Tex.-N. M.	807	—13	—208
Ark.-N. La.-E. Tex.	125	+ 4	— 17
Oklahoma	319	—30	— 31
Kansas-S. Nebraska	178	+ 5	+ 15
Illinois-Eastern	123	+12	— 23
Rocky Mountains	223	— 3	+ 4
Pacific Coast	167	0	+ 5
Total U. S.	2,566	—10	—272
Western Canada	130	— 2	— 50
Total	2,696	—12	—322

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States, Pacific Coast, and Illinois-Eastern areas are shown on pages 308 and 309.

Merrick Drilling Co. is drilling another test for D. M. Wallace in the latter's newly opened gas-producing area in the Juan Fernandez Survey, in Jackson County, Texas Gulf Coast. The confirmation test, 2 Miller, is 2,000 ft. north of the discovery well, completed in a 6,000-ft. sand.

Bass Drilling Co. has contracted with Highland Oil Co. for the latter's second well for the Hornberger field in eastern Jackson County, near the Wharton County line. The second test, 2 Hudgins, is 933 ft. southeast of the operator's discovery well. Contract is for 5,600 ft.

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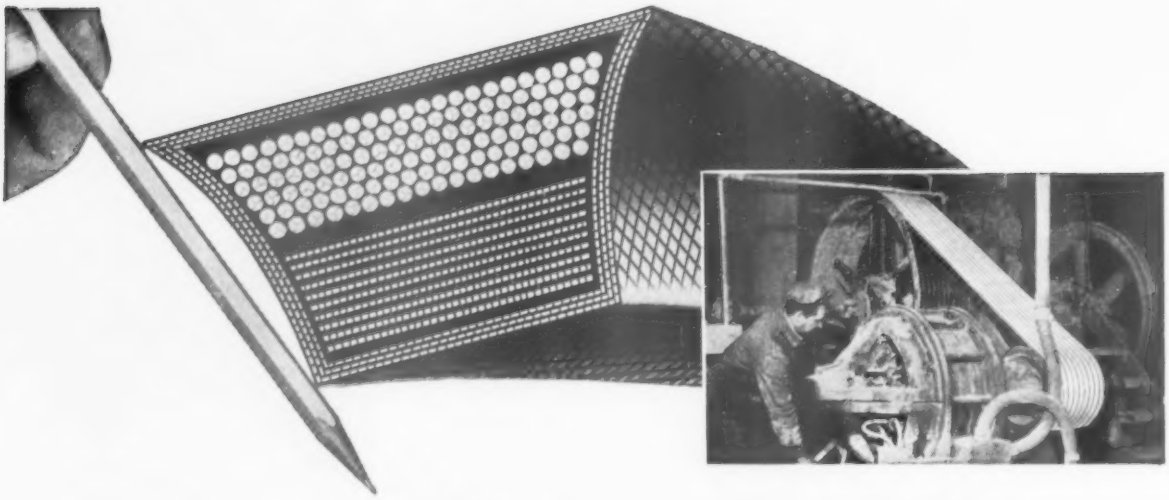

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As the belt bends, grip its sides between your fingers and thumb.

If the belt has *straight sides* you feel the sides bulge out. This forces the sides of the belt to press *unevenly* against the V-pulley . . . and you get concentrated wear at the points shown by the arrows.

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When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES—the Gates Vulco Rope!

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NATURAL GAS

Phillips to Begin Deliveries To Permian Late This Year

BARTLESVILLE, Okla. — Phillips Petroleum Co. has revealed that it will begin deliveries the latter part of this year under contracts covering the sale of 225,000,000 cu. ft. of gas daily to Permian Basin Pipeline Co. The latter company started construction of its new transmission line from the Permian basin immediately after the necessary authority was granted by the Federal Power Commission May 1 *(The Oil and Gas Journal, May 11, page 163)*. The gas will be delivered to Northern Natural Gas Co. at Dumas in the Texas panhandle for transmission to northern markets.

Phillips said a substantial portion of the total gas volume to Permian will be residue gas after extraction of about 427,000 gal. daily of liquids by the former's West Texas plants.

The Permian line also will provide an outlet for gas reserves owned by Phillips in Pucket Ellenburger field, Pecos County, Texas, where the discovery well completed in 1952 by the company flowed 100,000,000 cu. ft. of gas daily.

The deliveries to Permian will be the first under new contracts which will boost Phillips' daily deliveries over the next 2 years by 718,000,000 cu. ft.

Gas Firm Plans Supply to New Allied Chemical Unit

WASHINGTON.—Northern Natural Gas Co., Omaha, Neb., has received Federal Power Commission authority to construct pipe-line facilities to supply natural gas on an interruptible basis to the nitrogen division of Allied Chemical & Dye Corp.

The gas will be used in a plant, to be built near La Platte, Neb., for production of fertilizer products.

Northern will build 1.4 miles of pipe and metering and regulating facilities to deliver up to 12,000,000 cu. ft. of gas daily on an interruptible basis. Cost of the facilities, to be located in Sarpy County, Nebraska, is estimated at $48,000.

FPC Turns Down Motion

WASHINGTON.—A motion that the Federal Power Commission direct Texas Eastern Transmission Corp., Shreveport, to submit evidence that it possesses an adequate supply of natural gas to serve Algonquin Gas Transmission Co., Boston, in addition to existing customers, has been denied by FPC.

Tennessee Gas Transmission Co., Houston, and its subsidiary, Northeastern Gas Transmission Co., Springfield, Mass., filed the motion February 3. Hearings are now under way before the FPC on applications of Algonquin and Northeastern to serve the New England area.

Pilot Gas-Injection Project In Wilmington Field Begins

LONG BEACH.—With Long Beach Harbor Commission and other city officials presiding, formal opening of a pilot gas-injection program in the Harbor area of the Wilmington field was held here recently.

The $385,000 compressor plant, which started operation four days earlier, has a 12,000 M.c.f. daily capacity. If the trial program proves successful, facilities will be expanded to inject about 20,000 M.c.f. daily.

Initial operations involve the injection of approximately 6,000 M.c.f. of gas daily into three Terminal zone wells operated by Long Beach Oil Development Co. Richfield Oil Corp., as contractor for other city-owned tidelands properties, shortly will start injecting a similar volume into other Pier A wells.

Meanwhile, the Harbor Department is proceeding with plans for starting a water-injection program in a small upper Terminal subpool. One 120-ft. supply well already has been completed, and a second is being drilled. Tests of the first showed it capable of supplying almost 2,000 bbl. of filtered, substantially algae-free ocean water daily.

NATURAL GASOLINE

Construction to Start Soon On New Manderson Unit

MANDERSON, Wyo.—Construction of a $15,000,000 natural-gasoline plant will get under way here soon. Associates in the enterprise are Socony-Vacuum Oil Co., Sohio Petroleum Co., Stanolind Oil & Gas Co., Pioneer Oil Co., and Gulf Oil Corp. Gas and oil with a high sulfur content will be handled at the plant.

Jefferson Lake Sulphur Co. will be plant operator and dry gas will be handled by Montana-Dakota Utilities Co. Gates Rubber Co. will direct the sale of sulfur products.

New Cities Service Plant Is Placed in Operation

BLACKWELL, Okla.—Cities Service Oil Co.'s new gasoline plant, designed to produce approximately 200,000 gal. of liquids daily, has been placed in operation near here.

Daily output will include 57,000 gal. of natural gasoline, 125,000 gal. of L.P.G., and 20,000 gal. of isobutanes. Ultimate gas-processing capacity will be 190,000,000 cu. ft. per day.

Also included in the project is a pipe line for movement of products to the recently modernized refinery at Ponca City, Okla.

Gas from Hugoton field is sent through the company's 26-in. line to the plant. Residue gas from the plant is sent back into the line and sold in Kansas and Missouri.

Texas Governor Signs Co-op Gas Plant Measure

AUSTIN.—Gov. Allan Shivers has signed into law a bill authorizing the Railroad Commission to approve cooperative agreements for operation of natural-gasoline plants and other gas conservation facilities.

The bill states that Texas resources are now being wasted. It says large amounts of gas are sold to transmission lines without removal of liquid products, and the products are later removed and sold in other states.

It provides that agreements will be reached only after it has been determined they are in the interest of conservation.

Operation of Glen Cove Plant Expected in July

COLEMAN, Tex.—A $500,000 natural-gasoline plant being constructed by Luling Oil & Gas Co. is expected to be in operation by July 15. It is designed to process approximately 5,000,000 cu. ft. of gas daily from nearby Glen Cove field.

The company plans to sell residue gas to a pipe-line company or use it to repressure the field. There are between 80 and 100 wells producing in the area.

Almost 3 miles **DEEP** *in a Texas well*

HIGH-PRESSURE CASING JOB "OK" WITH UNAFLO*

CEMENTING THEIR DEEPEST SINGLE STRING in the Gulf Coast area (7" casing at 14,595') on the McFaddin Trust No. 1 well near Port Arthur, Texas, the Magnolia Petroleum Company encountered hydrostatic pressure of 13,000 psi...bottom hole temperature 246°F. With an annular space of only 11/16", Unaflo—the oil-well cement with the *retarded* set—stayed fluid and pumpable.

Magnolia used 325 sacks of Unaflo for this tough section of their deep well, and got a good job without a hitch. For the same reliable performance in your next well . . . be sure to specify Unaflo Oil-Well Cement. It protects your investment 3 ways:

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SUSTAINED FLUIDITY—Unaflo stays fluid and pumpable throughout the retardation period. It's not just another slow-setting cement. The set is postponed; gives ample time to get cement in place.

HARDENS NORMALLY—Unaflo, after its retarded period, makes a strong tight seal, resistant to sulfate waters.

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Magnolia's McFaddin Trust No. 1 Block B in the heart of Texas' Gulf Coast oil fields near Port Arthur. Unaflo Oil Well Cement met problems of pressure, heat, small annular space.

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OIL-FIELD CEMENTS

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Atlas High-Early Cement—Type III

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EXPLORATION

Geophysics for the Layman

by Philip C. Ingalls

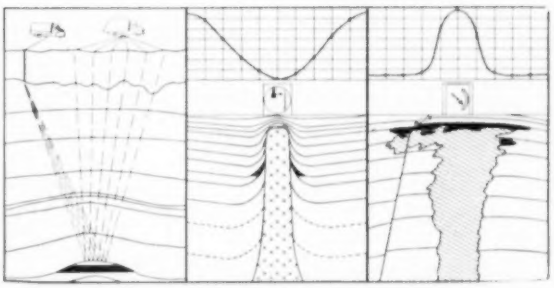
GEOPHYSICS is probably the most difficult branch of the oil industry to adequately explain to the layman.

Geophysicists in the field often tell curious laymen that they are "taking a picture of the underground rocks for the purpose of determining if those rocks might contain oil." That's a good explanation. It is not wrong, it appears plausible, and usually satisfies the curiosity of the uninitiated. However, when the questioner is not satisfied with that answer and asks "how?", a geophysicist can be hard put to frame an easily understood answer. Ideally he should tell his story so as not to start a chain reaction of questions that become increasingly difficult to answer without getting hopelessly bogged down in geology and physics.

The geophysical exhibit at the Hall of Science at the International Petroleum Exposition is answering the layman's "how?" Here, in addition to displaying actual instruments, simple explanations of the reflection seismograph, the gravimeter, and the magnetometer are presented by three animated models.

1. In the seismic model, moving lights trace the path of a seismic wave as it travels from the shot point downward through the geologic section and is reflected back to the electric detectors on the surface. An explanatory card tells that the time required for this travel is recorded in seconds and that shorter travel time at one or more points indicates that the reflecting bed is bowed upward and may mean an oil trap.

A nearby exhibit demonstrates how seismic waves are reflected from various rock layers and are normally detected at the surface. This exhibit consists of a set of springs representing the cross-section of the earth in which waves are generated. The reflections are actually recorded on the screen of an oscilloscope, below which there is a diagram pointing out the shot instant, the reflection at the shale-limestone boundary, the reflection at the limestone-granite boundary, and the multiple reflections in the shale and limestone.



Sketches of the geophysical exhibit's activated models illustrating the seismograph, gravimeter, and magnetometer.

2. Operation of the gravimeter is shown by a little weight on a spring mounted in a cutaway can which travels back and forth over a cross-section including a salt plug. The weight moves up as the "instrument" passes over the plug and measurements are plotted on a chart above the model. The explanation points out that the rocks below the gravimeter vary in their gravitational attraction, the denser rocks exerting the greater pull. When the meter is over the salt plug, whose density is comparatively low, a gravity minimum is shown.

3. The model illustrating the use of the magnetometer is similar to that of the gravimeter but the small weight is replaced by a needle which dips and rises as the instrument passes back and forth over a cross-section showing a serpentine plug. A card explains that the earth materials are somewhat magnetized and exert a pull on the balanced "compass needle" in the magnetometer. A serpentine plug, being more magnetized than the surrounding material, causes more deflection of the needle when the magnetometer is over it.

Though each of these explanations is a far cry from a technical discussion of the principles of the illustrated instruments, they do tell a story in a way that does not give a misleading picture of what geophysicists are up to when they do such strange things along the north line of the east forty.

The geophysical exhibit at the Hall of Science is proof that geophysics can be explained in such a way as to allay some of the possible misgivings of landowners.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

COLORADO . . . Forest Oil Co. has completed the "D" sand discovery at 1 Causey, NE SW NW 23-2s-57w, Adams County. Pump gage was 213 bbl. of oil daily. The well is expected to extend activity south from Little Beaver field, continuing the north-south trend of production through this portion of the Denver-Julesburg basin.

MISSISSIPPI . . . Carter Oil Co. has burned gas on drill-stem test at 1 Fowler-Langley unit, C SE SE 22-13s-2e, Chickasaw County. The indicated discovery is located about 15 miles northwest of new Trebloc field and about 12 miles southwest of Coleville field in the Paleozoic area of northeastern Mississippi.

MONTANA . . . Shell Oil Co.'s Cabin Creek discovery is reported flowing 900 bbl. of oil per day, natural. Perforations were from 8,912-57, 8,833-84, and 8,688-8,760 ft., probably in Red River. Other wells along the Cedar Creek anticline have not flowed without acidization.

WILDCAT COMPLETIONS, APRIL 1953

	Total	Oil	Gas	Dry	Footage	1953 Total comp.	1953 Cum. (1,000 ft.)	1952 Total comp.	1952 Cum. (1,000 ft.)
Kansas	65	7	1	57	237,046	289	1,069	292	1,127
Oklahoma	60	12	1	47	242,497	236	1,059	256	1,193
Texas	415	72	19	324	2,005,968	1,701	8,147	1,646	7,810
North Central	166	27	3	136	563,684	702	2,487	762	2,582
West	62	15	2	45	342,633	261	1,533	276	1,578
Panhandle	0	0	0	0	0	11	52	21	140
East	21	3	0	18	103,157	94	452	77	450
Gulf Coast	82	13	8	61	594,470	287	2,132	239	1,815
Southwest	84	14	6	64	402,024	346	1,491	271	1,245
Louisiana	32	7	2	23	322,679	143	1,264	106	919
North	6	0	0	6	28,667	42	242	45	253
South	26	7	2	17	294,012	101	1,022	61	666
Mississippi	17	0	2	15	105,495	66	489	58	436
Arkansas	10	0	0	10	23,838	37	152	24	115
Nebraska	17	2	0	15	84,158	49	251	43	171
Rocky Mountains	33	6	2	25	187,705	179	1,018	118	656
Dakotas	3	0	0	3	11,023	16	84	7	43
New Mexico	10	2	0	8	79,410	55	359	44	311
California	53	7	0	46	233,257	209	957	187	890
Tri-States	57	0	1	56	108,196	262	517	363	720
Others	34	2	4	28	100,480	148	515	158	476
Total April 1953	806	*117	32	657	3,741,752	3,390	15,881	3,302	14,867
Total March 1953	802	107	31	664	3,753,940				
Cumulative 1953	3,390	488	114	2,788	15,881,022	3,390	15,881		
Cumulative 1952	3,302	518	90	2,694	14,867,667			3,302	14,867

*Includes 5 condensate wells: Tex. Gulf 1, S. La. 4.

April Wildcat Completions Ahead of 1952

by John C. McCaslin

APRIL wildcat completions in the United States were up only slightly over the previous month, but continued to keep ahead of last year's figures.

New oil discoveries for the first 4 months of 1953 are down slightly from last year's figures, but new gas strikes and dry holes are up substantially. Total wildcat footage drilled for the first 4 months still has a good lead over last year. Wildcat completions so far this year are up in all areas except Kansas, Oklahoma, and the tri-state area. Total Texas wildcats for the year are ahead of 1952, but North Texas, West Texas, and the Panhandle show declines from 1952 figures.

The most substantial gain in wildcat completions continues to be in the Rocky Mountain area. Completions in that region show a 51 per cent gain over last year. Wildcat completions in the Dakotas are up more than 100 per cent over last year. A healthy gain in wildcat drilling is noted in the Louisiana-Mississippi area, and in Florida.

Williston basin . . . Significant developments in the Montana portion of the Williston basin brought that area back into the exploratory news. A new indicated discovery in Richland County, Montana, northwest of Sidney in the Bronson area, is apparently one of the most important developments since production was opened in the basin.

The new Richland County discovery, Sun Oil Co. and Phillips Petroleum Co. 1 Dynneson, deepest well ever dug in Montana, is the first to show for production in the central part of the Williston basin between the Baker-Glendive anticline in Montana and the Nesson anticline in North Dakota. Tests from 12,591-12,637 ft. indicated the well has commercial possibilities of oil production from the Ordovician. The apparent discovery, which is on the approximate structural center of the basin, is 45 miles east of Richey field production, and an equal distance southeast of Poplar field. It is 71 miles southwest of Beaver Lodge in North Dakota.

Directly south of the Sun-Phillips strike Shell Oil Co. is proving a major Mississippian discovery at Cabin Creek, about 15 miles southeast of Shell's Pine Unit which produces from the Devonian and Ordovician. The Cabin Creek discovery, which is the first to recover a significant amount of oil from the Mississippian on the Baker-Glendive anticline, is northwest of Little Beaver pool, also an Ordovician producer. The Madison is to date the primary producing formation within the Williston basin. The results of Shell's tests at Cabin Creek indicate the possibility of a field similar to the North Dakota Madison fields.

Southeast New Mexico . . . Chaves County is known to offer a number of possible reservoir zones, from the Wolfcamp of the Lower Permian group, to basement rock, and at economic depths. It is thought to offer little in the way of inducement for shallow Permian exploration.

In April exploration for the deeper rocks paid off when Republic Natural Gas Co. and Seaboard Oil Co. of Delaware completed 1 White Ranch successfully. This well had top of the Devonian at 8,727 ft., minus datum point of 4,935 ft., but found oil in the Siluro-Devonian from 8,719-79 ft. Completion potential was 294 bbl. of 47°-gravity oil per day.

The 1 White Ranch was drilled in a pre-Permian intermediate area *(See The Oil and Gas Journal, October 20, 1952, "Petroleum Possibilities in Eddy and Chaves counties")* which has had little exploration. Past failures in this and the basin deep zones have been blamed on the failure of seismic structures to extend into the Siluro-Devonian, caused by a thickening of Pennsylvanian beds.

Location of the discovery is in 34-11s-29e, about 12 miles southeast of Chisum field in 11s-27e.

Of equal importance, Continental Oil Co. 1 Anderson Ranch unit, 11-16s-32e, Lea County, jumped Devonian production 25 miles south from East Caprock and Moore fields. This well, on a large seismic structure, was completed from 134 ft. of pay in the Devonian for a daily potential of 1,968 bbl. of oil.

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Completions Show Gain

by John C. McCaslin

TOTAL completions in the United States in April showed a 10 per cent gain over the previous month, but are running slightly behind last year's cumulative figures for the first 4 months of the year. However, April completions are the highest since January. Only gas wells and dry holes show an increase over last year's comparative figures. Cumulative footage drilled in the country by the industry is lagging about 2 million feet behind last year's figures.

The number of active rigs operating has been on the increase recently, promising more completions for late spring and early summer. In Texas, where total wells drilled have been running low all year, a substantial increase over the previous month was noted. Completed wells were up in Oklahoma, the Rocky Mountain states, California, the tri-state area, the eastern area, and in the Southeast.

The Rocky Mountain area continues to be the outstanding development region in the country. Activity in the Denver-Julesburg basin has been running at a rapid pace the past 2 months, despite bad weather conditions in the area much of the time. A total 27 new locations were announced in one week in April in the area. The opening of the Platte Pipe Line and feeder lines from Sterling, Colo., and Kimball, Neb., recently has influenced development drilling considerably. A second major producing trend is beginning to take shape in the Denver-Julesburg basin in the Morgan-Washington-Adams area.

Focal point of the new trend is Little Beaver field, rapidly becoming a leading producer in the basin. The new field is one of the most attractive in the state, having excellent potentials and multiple pay zones. Both the "J" and "D" sands are producing in the field. The recent opening of Badger Creek field between Middlemist and Little Beaver has increasd the importance of the new trend. There are more than 30 producing oil wells in the Little Beaver area. Northeastward along the indicated new trend a new pool has been opened in Morgan County, Colorado.

Continental Oil Co. opened a new producing formation in the Sussex unit, Johnson County, Wyoming, for the sixth pay zone in this unit. The Sundance is the new pay in the area, which has production from the Sussex, Shannon, Wall Creek, Lakota, and Tensleep.

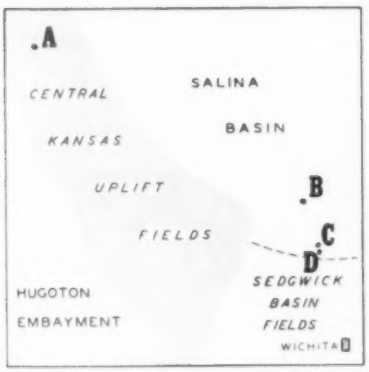
SUMMARY OF COMPLETIONS, APRIL 1953

	Total comp.	Oil	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	Over 12,500 ft.	Total footage	Rigs and drilling
New York	60	35	0	25	60	0	0	0	0	0	82,100	53
Pennsylvania	142	64	18	60	127	10	5	0	0	0	258,120	150
West Virginia	56	5	36	15	32	22	2	0	0	0	142,468	193
Maryland	1	0	0	1	0	1	0	0	0	0	4,021	3
Ohio	110	42	18	50	50	60	0	0	0	0	249,126	169
Kentucky	83	18	21	44	57	26	0	0	0	0	168,209	156
Illinois	111	55	0	56	47	64	0	0	0	0	278,698	297
Indiana	96	41	0	55	76	20	0	0	0	0	168,068	126
Michigan	37	17	2	18	17	14	6	0	0	0	114,060	108
Kansas	399	179	40	180	43	355	1	0	0	0	1,329,261	396
Nebraska	26	11	0	15	0	12	14	0	0	0	134,609	32
Oklahoma	561	342	15	204	184	260	82	24	10	1	1,964,658	584
Texas	1,440	794	105	541	323	560	363	149	38	7	6,622,261	1,260
N. Central (Dist. 7-B & 9)	521	285	7	229	201	218	98	3	1	0	1,739,007	331
West (Dist. 7-C & 8)	288	211	4	73	29	107	106	33	9	4	1,532,270	387
Panhandle (Dist. 10)	90	41	40	9	16	74	0	0	0	0	266,465	77
East (Dist. 5 & 6)	46	15	2	29	3	16	18	8	1	0	259,109	89
Gulf Coast (Dist. 2 & 3)	243	109	30	104	27	48	68	78	19	3	1,580,032	221
Southwest (Dist. 1 & 4)	252	133	22	97	47	97	73	27	8	0	1,245,378	155
Louisiana	233	123	18	92	40	30	36	48	46	33	1,834,991	313
North	62	28	9	25	25	12	16	8	1	0	251,059	109
South	171	95	9	67	15	18	20	40	45	33	1,583,932	204
Arkansas	39	19	0	20	8	24	7	0	0	0	135,243	43
Mississippi	26	6	2	18	1	1	22	1	1	0	164,527	33
Ala.-Ga.-Fla.	9	4	0	5	0	3	6	0	0	0	47,195	14
Montana	27	15	1	11	6	12	3	6	0	0	121,014	71
Wyoming	54	44	2	8	6	20	20	6	2	0	277,513	183
Colorado	44	19	7	18	2	14	27	1	0	0	225,368	66
Utah	2	2	0	0	0	0	2	0	0	0	11,509	22
New Mexico	92	51	24	17	16	26	20	13	12	5	551,281	197
California	221	160	4	57	73	77	42	15	10	4	916,548	263
North Dakota	14	13	0	1	0	1	0	13	0	0	113,213	38
Miscellaneous	§13	0	1	12	11	1	1	0	0	0	19,917	¶23
Total April 1953	3,896	†2,059	314	*1,523	1,179	1,613	659	276	119	50	15,933,978	‡4,793
Total March 1953	3,522	1,807	309	1,406	1,043	1,441	636	270	100	32	14,464,066	4,806
Cumulative 1953	14,879	7,651	1,152	6,076	4,412	6,131	2,602	1,140	456	138	61,007,488	
Cumulative 1952	15,247	8,246	1,028	5,973	4,551	6,113	2,910	1,116	453	104	63,108,480	
Western Canada	145	72	10	63	21	58	58	7	1	0	656,523	
Alberta	103	55	6	42	13	29	54	6	1	0	507,941	
Saskatchewan	31	17	2	12	4	25	1	1	0	0	109,688	
Manitoba	5	0	0	5	1	4	0	0	0	0	16,197	
N.W.T.-British Columbia	6	0	2	4	3	0	3	0	0	0	22,697	

*Incl. 116 service wells: N. Y. 25, Pa. 55, Ohio 10, Kans. 5, Okla. 18, W. Tex. 3. †Incl. 21 condensate wells: Okla. 5, N. Tex. 1, W. Tex. 1, E. Tex. 2, Tex. Gulf 1, S. La. 11. ‡Incl. all wells rigged up and/or drilling at month end. §Incl. Tenn. 11, 1 gas, 10 dry, 12,012 ft.; 2 S. D. 7,905 ft. ¶Incl. Tenn. 12, S. D. 6, Ariz.-Idaho-Nev. 5.

KANSAS

Casing Set at Rank Norton Pool Opener



Map of the middle section of Kansas showing post-Mississippian structural provinces and locations of four significant discoveries in the area.

At the extreme northern end of the Central Kansas Uplift Jones, Shelburne & Farmer have an apparent pool opener at 1 Lawson, SE SE NW 36-3s-24w (A on map). The rank wildcat is located in Norton County, 23 miles northwest of nearest production in Ray pool.

A drill-stem test from the Arbuckle top at 3,779 to 3,790 ft. recovered 540 ft. of gas and 1,110 ft. of clean oil.

Discovery Indicated In Salina Basin Area

John J. Darrah is testing 1 Boese, SE NW NW 34-19s-2w, 1 mile south of new lively pool (C on map), after swabbing 60 bbl. of oil in 10 hours. A drill-stem test of the Mississippian at the indicated pool opened (D on map) recovered 58 ft. of mud with a good show of oil. The swab test following acid treatment of perforations at 2,951-58 ft.

The 1 Boese is located directly south of new Lively pool in McPherson County, which was recently opened flowing 273 bbl. of oil daily. Both wells are located at the extreme southern end of the Salina basin. Recently another new pool was opened in the basin at (B on map). The new discovery was National Associated Petroleum Co.'s 1 Olson, Saline County, which produced more than 200 bbl. of oil daily from the Maquoketa dolomite which overlies the Viola of Ordovician age. These discoveries, along with recent drilling in Smolan pool, has further increased interest in the Salina basin, which has no production except at its extreme southern extremity.

New Deep Strike Awaits Pipe-Line Connections

J. M. Huber Corp. has a new discovery 1 mile north of Liberal-Light pool in southern Seward County, southwestern Kansas, in the Hugoton embayment area of the Anadarko basin.

The 1 Light estate, C SW SW 2-35s-32w, is awaiting pipe-line connections after flowing 9 bbl. of oil per hour and 11,000 M.c.f. of gas per day through a ¼-in. choke. Pay is the Morrow at 5,961-68 ft.

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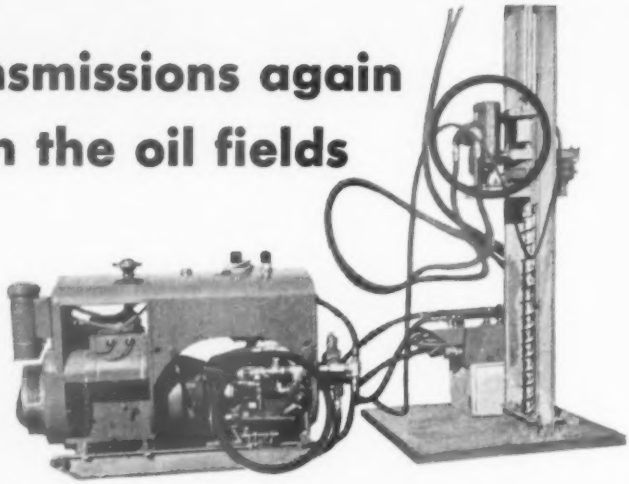

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Hugoton embayment raises the total of new strikes in the upper reaches of the Anadarko basin to nine in recent months.

The Anadarko basin and its northerly extension, the Hugoton embayment, is the most active rank wildcat area in the Mid-Continent region. Considerable extension activity has been reported in the Liberal-Light gas area in recent months, particularly in Beaver County, Oklahoma Panhandle. A number of new gas discoveries have been made in Meade and Morton counties, southwestern Kansas, this year. The most outstanding of these is the North Sturgis area of Cimarron County, Oklahoma Panhandle. A new pool was recently opened in the Kismet area of Meade County, Kansas, and Morton County's Greenwood gas area is one of the outstanding developments in the Anadarko basin.

TEXAS

NORTH TEXAS

Wildcats Completed in Coleman, Nolan Counties

Western Petroleum Co. and Yeatman Drilling Co. 1 Hubert Stokes, J. W. Robertson Survey, Coleman County oil find, has been completed for a daily flowing potential of 127 bbl. Pay section was open hole between 3,494-3,558 ft., total depth, and completion gage was through open 2-in. tubing.

In Nolan County, Stanolind Oil and Gas Co. finished 1-E TXL, Cisco sand discovery 8 miles north of Blackwell. Completion was on the pump for 177 bbl. of oil a day, plus 10 bbl. of water. Pay section was topped at 4,072 ft. and perforations made at 4,081-84 and 4,088-96 ft. This well also showed some oil on drill-stem test of the Canyon reef at 4,620-4,860 ft.

WEST TEXAS

Water Table Established In Headlee Pool

Development drilling and confirmation wells featured the week's work in most West Texas fields. Fields gaining extension or link wells included Hulldale in Schleicher County, Auld in Lynn, and Pegasus in Upton County.

Water table in Headlee... Texas Gulf Producing Co. 2 Headlee, northeast offset to the Ellenburger discovery of Headlee pool, Ector County, has established the oil-water contact for the pool around 12,443 ft. The discovery did not drill through the Ellenburger section, but completed at 13,106-13,270 ft.

No. 2 Headlee developed salt water on drill-stem test between 13,443-13,519 ft., total depth, and the upper section had not been tested at this report. The well had at least 373 ft. of Ellenburger above the water, and on formation top of 13,070 ft., it checked about 10 ft. high structurally to the discovery.

Texas Gulf has filed application to drill 1 Henry Sander in Section 8, which is a northeast offset to 2 Headlee. Projected depth is 13,500 ft. The firm's 3 Headlee, Section 17, was drilling below 12,000 ft. in dolomite. Tide Water Associated Oil Co. 1 Tom McKnight, northwest offset to the discovery, Section 7, was drilling below 12,605 ft.

Pegasus extension... Magnolia Petroleum Co. 1-U TXL, on the west-central side of the field, extended Pennsylvanian production to the southwest with a daily flowing potential of 528 bbl. of oil. Production was through 16/64-in. choke from perforations at 10,498-10,534 ft. Top of pay was 10,452 ft., minus 7,561 ft.

Auld confirmation... Magnolia 1 J. A. Timmons gave the new pool its second well and south extension. Completion was for 218 bbl. of oil a day through 14/64-in. choke from pay at 9,806-20 and 9,835-65 ft.

Hulldale link well... Sinclair Oil & Gas Co. 4 McClatchey, ¾-mile south and ⅝-mile north of production, closed the gap between the north and south fields, and gave the area another flush Pennsylvanian producer. Potential through open 2-in. tubing was 566 bbl. of oil a day from pay at 5,646-62 ft.

EAST TEXAS

Navarro Wildcat Is Pettit Discovery

Lawton Oil Corp. 1-A Neal, Pettit limestone discovery 5 miles southeast of Eureka, and south of the Carter-Gragg (Pettit) field, completed for 156 bbl. of 31° oil a day through 13/64-in. choke from open hole section at 6,832-6,960 ft. Top of the Pettit was 6,815 ft. on elevation of 347 ft.

Location is on a Stanolind Oil & Gas Co. farmout, which company also owns offset locations.

SOUTHWEST TEXAS

New Pay at Goose Island

Humble Oil & Refining Co. has opened another pay zone for Goose Island field, located 5 miles north of Rockport, in Aransas County, with the completion of its 1 Aransas Bay-State Tract 80, flowing 46.75 bbl. of 42.2°-gravity oil per day through ¼-in. choke. Pay is open through casing perforations at 6,934-40 ft. Hole was drilled to 7,755 ft. and casing cemented on bottom. The well had a flowing pressure of 250 psi. and a gas-oil ratio of 1,996 cu. ft. per barrel.

Vicksburg Oil Discovery Indicated in Bee County

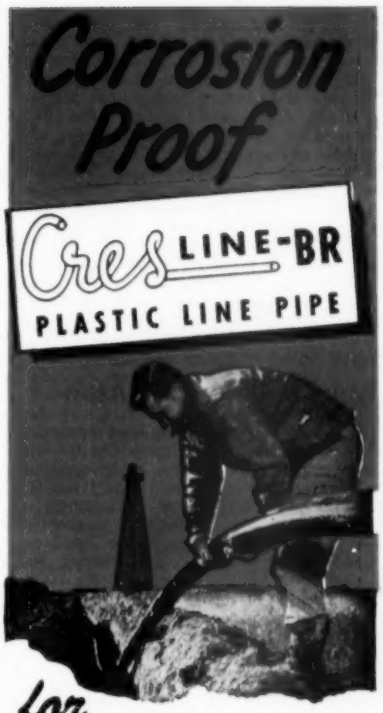
Discovery of a new oil field, located 8 miles southwest of Skidmore, in Bee County, is indicated by showings encountered by H. R. Smith and associates at their 1 Steinmyer. Showings were in a Vicksburg sand, from which 60 ft. of pipe-line oil and 30 ft. of oil-cut mud was recovered in a drill-stem of an interval at 4,166-68 ft. Tester was open only 4 minutes. Top of the Vicksburg was logged at 4,165 ft. Operators are running casing for production tests. Location is 2 miles northwest of the Tynan field.

TEXAS GULF COAST

Live Oak Wildcat Gets Showings in Queen City

Discovery of gas-distillate production in Queen City sand appears to have been made by F. B. Cochran, Jr., in his 1 Stephens, a wildcat located 12 miles southwest of George West, in Live Oak County, in the lower Gulf Coast area. The well, drilled to 5,065 ft. in the indicated pay zone, now has production casing run for completion attempts. Location, 2½ miles north of Dinero, in the Simmons Subdivision 74, is about ¾ mile south of the South White Creek field, which produces from Jackson sand at 1,800 ft.

Three drill-stem tests were made, all re-



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covering gas and distillate. The first, open 20 minutes through ¼-in. chokes, was of an interval at 5,045-56 ft. Working pressure gaged 190 psi., bottom-hole flowing pressure 475 psi., and bottom-hole shutin pressure 2,220 psi. A 32-minute test at 5,056-62 ft. had working pressure of 1,290 psi., and bottom-hole pressures of 1,940 psi. flowing and 2,250 psi. shutin. Recovery was 10 ft. of distillate. The final test, open 20 minutes, at 5,062-65 ft. (total depth), had working pressure of 675 psi. and bottom-hole pressures of 1,400 psi. flowing and 2,200 psi. shutin. Recovery was 100 ft. of distillate and 60 ft. of heavily distillate-cut mud. A trace of water was shown in the final test.

New Frio-Sand Reservoir Opened in Big Hill Area

A new Frio reservoir has been opened in the Big Hill area of Jefferson County with the completion by Adams & Haggarty of their 5-F Fee in a pay at 7,634-95 ft. The well flowed 225.83 bbl. of 33.7°-gravity oil per day through ⅛-in. choke on its potential gage. Tubing pressure registered 1,820 psi. Gas-oil ratio was 972 cu. ft. per barrel. This is one of a series of new-pay discoveries which have been made this year in the area, scene of an active exploratory and development program.

KENTUCKY

EASTERN KENTUCKY

In Lee County 11-M-69, Price Fraley is drilling at 1,123 ft. at 9 Pryse heirs, and attempted extension to Ida May pool. Corniferous lime was topped at 1,095 ft.

In Wolfe County 11-O-70, Morris and White have a dry hole at their 3 John Bush. Corniferous lime was topped at 1,131 ft. and drilled to a total depth of 1,169 ft. A show of oil was had from 1,132 to 1,159 ft., but had too much water to make a profitable completion.

NEW MEXICO

SOUTHEAST NEW MEXICO

Richardson-Bass Wildcat Drilling Below 16,000 ft.

Richardson & Bass 1 Cobb-Federal, Eddy County wildcat, was drilling ahead below 16,070 ft. in dolomite, a new depth record for the county. This well, situated on the northern edge of the Delaware basin, may prove the basin much deeper than heretofore calculated. Formation tops identified so far are the Mississippian at 13,680 ft. and Devonian at 14,395 ft. Elevation is 3,515 ft.

A drill-stem test from 14,710-14,830 ft., open 2 hours, recovered 280 ft. of mud, plus water blanket, and no shows. A 1-hour test at 15,928-16,038 ft. recovered the water blanket and drilling mud with no shows.

The firm's 1 Fidel-Federal was drilling lime and shale at 12,590 ft., and 1 Harrison-Federal was drilling in lime at 13,738 ft. The latter test flowed gas and distillate on test to 12,365 ft.

Lea County... Southern Union Gas Co. 1 Parcell-Federal, 19-21s-38e, flowed 16 bbl. of oil in 1 hour on drill stem test of the Abo section from 7,149-7,313 ft. Location is 2 miles east of nearest production in the Hare area.

The Texas Co. 1 Ferguson, 30-18s-39e, extended San Andres production 1 mile west of the East Hobbs pool. Potential was 628 bbl. of oil a day through ½-in. choke from pay at 4,445-66 ft.

WESTERN NEW MEXICO

Valencia County... Humble Oil & Refining Co. 1 Santa Fe Pacific, 15 miles southwest of Los Lunas, cored shale, lime and sand with no shows from 8,905-42 ft., total depth.

Lynch Oil Co. was reported planning to reenter an old test in 5-6n-1e, 7 miles northeast of Humble 1 Santa Fe-Pacific, and near the town of Dalies. Old total depth was 6,196 ft. The new operation will be carried as 1 Dalies.

APPALACHIAN AREA

OHIO

The first successful Hydrafrac in Jackson Township, Muskingum County, was completed by Frank Brandle on 8 Rolla Fairall, Lot 13. Clinton sand at 3,066-3,112 ft. made a good showing of oil that increased to 250 bbl. after treatment.

In Mt. Zion pool, Preston Oil 1 Otta Horn, Section 17, Jackson Township, Knox County, made 260 bbl. after treatment from sand at 2,870-2,910 ft.

The R. B. Weed 2 Clarence Lang, Lot 13, New Castle Township, Coshocton County,

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made 50 bbl. in 24 hours after a bridge was drilled out. Clinton sand was found at 3,202-3,254 ft., and shot with 180 qt. In Lot 13, the Mossholder Drilling 1 L. H. Underwood made 50 bbl. daily after treatment from sand at 3,024-3,041 ft.

OKLAHOMA

Fast Development of Northeast Purdy Continues

Western Garvin County's Northeast Purdy pool is undergoing a rapid development program. Phillips Petroleum Co. is finaling 1 Arnesen, C NW SE 2-3n-4w, 1 mile west of flank production in the pool. The well flowed 133 bbl. of oil in 23 hours from perforations at 8,650-68, 8,710-38, and 9,676-9,758 ft. Phillips is also moving in rotary tools to drill 1 Mayes "A," C NW NW 7-3n-3w, off the south flank of the pool. Further south Magnolia has a stepout at 1 Duncan-Neill unit, NW NE SW Section 7. Magnolia is preparing to perforate the Hart sand at 1 Duncan, NE SE SE 1-3n-4w, after the well flowed 505 bbl. of oil in 12 hours. The same operator has a stepout planned off the northwest side of the pool at 1 Duncan Williams unit, SE SW 6-3n-3w.

Northeast Purdy pool was opened in 1952 at Magnolia 1 Duncan-Alcorn unit, NE NE SE 1-3n-4w. The Springer discovery flowed 566 bbl. of oil per day. Hart sand is also another pay in the area. The Hart discovery well was Superior 1 Aris Arner, S NE SE 7-3n-3w, which was completed for 55 bbl. of oil per day through a 20/64-in. choke.

Lincoln-Logan Area Active

Two central Oklahoma counties, Lincoln and Logan, continue to be the most active wildcatting areas in the state this spring.

Two new wildcats and a stepout test were announced for Lincoln County. The first test is 2 miles northeast of Stroud at Ben J. Taylor 1 Pennybaker, SW SW SE 11-15n-6e. The test will go to 4,000 ft. Puckett Drilling Co. is making hole below 4,029 ft. at 1 Orr, wildcat in the SE NE NW 24-15n-6e.

Athens Petroleum Co. reported a flow of 1,000 M.c.f. of gas per day with a light spray of oil at 1 Cabe, a possible strike southwest of Stroud in the SE SE SW 29-15n-6e. Production is from the Prue sand.

West of East Payson pool, the state's most active development area, Mid-Continent Petroleum Corp. will begin operations at a 5,300-ft. test at 1 First National Bank of Grove, SE SE NW 34-13n-4e, 1½ miles west of East Payson pool.

Production tests continue at W. H. Martgan 1 Orner, Hunton lime discovery in SE SW SE 31-17n-2e. On latest tests the well flowed 75 bbl. of fluid per hour through casing.

Logan County . . . Production tests are due at a Logan County stepout in the SE SE SE 33-19n-4w. A drill-stem test at 4,770-83 ft. in the Layton showed gas at the surface in 5 minutes at the rate of 1,000 M.c.f. per day and recovery was 350 ft. of clean oil at Altus Drilling Co. 1 Schaefer. This test is ¾ mile northeast of North Lovell pool.

L. W. Baker Drilling Co. 1 Walters, SW NW SE 29-15n-2w, looks like the second well for Southwest Pleasant Valley pool. A drill-stem test at 5,871-85 ft. in the Bartlesville flowed gas in 3 minutes at 5 to 6 million cubic feet daily. Recovery was 30 ft. of distillate. This is the confirmation well to Midstates Oil Corp.'s gas-distillate strike ¾ mile

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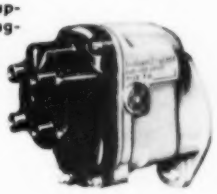

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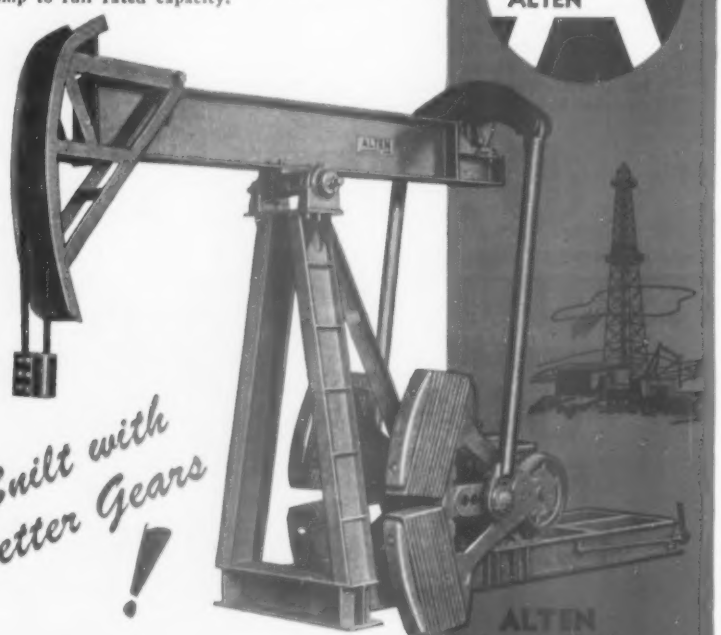

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to the west. The field discovery well also produced from the Bartlesville.

Big Flow at Outpost In Okfuskee County

R & R Oil Co. is completing a new pay flowing well in the Haydenville area, Okfuskee County, at 1 Beets, NE NE SE 36-13n-9e. The Red Fork is reported to be the new pay discovery for the area. The well made 60 bbl. of oil per hour on a 3-hour flow. A later test through a 20/64-in. choke flowed 16 bbl. of oil per hour. The discovery is located ¾ mile south of production in West Haydenville pool and is ¾ mile southwest of Northwest Morse pool production. The Dutcher sand is the primary producing sand in the area.

Coring Continues at Coal County Strike

Carter Oil Co. is coring below 7,946 ft. at an indicated new pool opener 4 miles north of Centrahoma pool in the northwestern part of Coal County. The 1 Morgan, SW NE SW 3-2n-9e, recovered 55 ft. of oil and gas-cut mud, 50 ft. of free oil and no water on a drill-stem test of the McLish at 7,637-70 ft. More pay is indicated at 7,689-7,714 and 7,715-34 ft.

Panhandle Pools Named

The Oklahoma Nomenclature Committee of the Mid-Continent Oil & Gas Association has named two new pools in the Oklahoma Panhandle, one of the state's important new producing areas.

Beaver County has a new pool at Carter Oil Co. 1 Kinnamon in the C SE NW 23-5n-23eCM. The committee has given the new pool the name South Forgan. The well flowed 2,900 M.c.f. of gas per day from Chester perforations at 6,486-6,510 ft.

The other new pool is located in Cimarron County in far northwestern Oklahoma at Cities Service Oil Co. 1 Whisennand, NE NE SW 2-5n-9eCM. The discovery well of Sturgis pool is rated at 5,200 M.c.f. of gas per day from perforations at 4,640-58 ft. in the Keyes sand.

MICHIGAN

Major Extension Due North Hamilton Pool

A major northwest extension on North Hamilton Richfield oil pool, Clare County, was in prospect at Sun Oil Co. 1 Coskey et al, NW NW SW 36-20n-4w., Frost Township, approximately 1½ miles northwest of the nearest oilwell in the field.

Well was bottomed out in the Richfield (possibly in the black lime Richfield base) at 5,391 ft. Long string of 5-in. casing was cemented at 5,215 ft. On the basis of core analysis, it appeared very likely that the 1 Coskey et al would be completed as a better-than-average Richfield oil well. Due to its outpost relationship to the developed part of the pool, its completion should stimulate additional drilling in this extension area. The bulk of the acreage within a reasonable radius in every direction from this well is held by Sun, discoverer and only producer in the pool.

A wildcat well in Sheridan Township, Mecosta County, which was completed earlier

this year as a Traverse oil discovery, was deepened to the Dundee and was drilled out dry in this objective. The deepening operation was started after the so-called Traverse discovery pay showed such a rapid production decline and water increase that operator elected to drill ahead. This failure was the C. W. Collin 1 May et al, NE NW SE 26-15n-7w. Dundee was logged at 3,855 ft. A small show of oil and, followed by a hole full of water, came in at 3,855-56 ft. Hole was drilled to 3,858 ft., total depth. Dundee section was reported to have shown a porous dolomite. It is expected that additional drilling in this area will follow in this year.

CANADA

Oberlin - Stettler Strike

New British Dominion Oil Co., Ltd., Inter Rock Oils, Ltd., Chamberlain Oil & Gas, Ltd., and associates have found light gravity crude oil and natural gas in the top of the basal quartz sand at their driller in the Oberlin-Stettler are of southern Alberta. This exploratory venture, located 90 miles northeast of Calgary, indicated approximately 5 ft. of gas and oil pay prior to entering a shale break.

The well, New British 11-12 Inter Rock, LSD 11, 12-38-21w4, is 1¼ miles southeast of wet gas wells in the region, 3 miles north of Gulf's Ewing Lake (North) D2 Devonian oil discovery well and about that same distance west of Stettler Devonian oil production.

The No. 11-12 well entered the basal sand at 4,328 ft., or 1,618 ft. below sea level, 56 ft. higher than that contact at the Picadilly-Interleduc 1 Laguerre gas well 1¼ miles to the northwest. The Picadilly groups venture found a very thin oil section that gave up only a small amount of oil and a large volume of water. That well was plugged back and is now producing natural gas from a sand above the basal zone.

Initial drill-stem test at the New British group's well was run from 4,323-30 ft., for 79 minutes. Natural gas flowed to the surface in 2 minutes, at maximum rate 2,800,000 cu. ft. daily, with mud flowing in 60 minutes, and a spray of oil in 66 minutes. Recovery was 70 ft. 30.8°-gravity clean crude oil.

Next test was run from 4,330-33 ft. for 2 hours. Tool partially plugged, and was cleared in 25 minutes. Gas flow was 810,000 cu. ft. daily and recovery was 30 ft. of clean oil.

Crew found a shale break from 4,333-39 ft. and then again entered a sand zone that appeared fairly tight—but showed some oil-staining. Coring is now continuing below 4,365 ft.

Brooks area... York Oils, Ltd., and Pathfinder Petroleums, Ltd., Calgary independents, started production testing operations at their discovery well in the Brooks area of southern Alberta. This new strike, 70 miles northeast of Lethbridge and 145 miles southeast of Calgary, gave up its gas and oil in the Sunburst sand section. Top of the Sunburst was encountered at 3,442 ft. and the well indicated around 23 ft. of gas zone plus 52 ft. of oil pay above the water line.

The well, York-Pathfinder 1 Brooks, LSD 10, 18-19-14w4, is 2 miles north of Brooks town. Hole was taken down to 3,571 ft., and string of 7-in. production casing was run to that depth. Hole was perforated from 3,478-92 ft., with 4 shots per ft. Following that perforation the well commenced flowing gas and oil, but flow rate was not measured, nor was the well permitted to flow for a lengthy period. Storage tanks were installed during the latter part of the week, and production tests are now under way. Gravity of the oil at this Brooks discovery is estimated at around 25°.

Ratcliffe area... Initial swabbing tests at the second Ratcliffe are driller in southern Saskatchewan are yielding fluid at the rate of about 3 bbl. hourly, with 60 per cent being oil, the balance water. Gravity of the oil is around 29°.

Backing this venture are Socony-Vacuum Exploration Co. and the team of Central Leduc Oils, Ltd., and Del Rio Producers, Ltd. The well, Socony-Central-Del Rio 2 Ratcliffe, LSD 12, 30-1-15w2, is ¾ mile north of the discovery well, 4¾ miles north of the International border and 40 miles south-southwest of Weyburn.

Prior to swab-testing the Madison limestone section was perforated in the interval 6,392-96 ft. A 1,000-gal. acid treatment was applied before swabbing was commenced, and a later 3,000-gal. shot was pumped into the perforations. Swabbing is being continued.

EASTERN CANADA

Gaspe... In the Gaspe peninsula of Quebec, operations by Gaspe Oil Ventures and associated companies have been handicapped by bad roads. The 2 Bald Mountain is resuming from 5,141 ft. after a fishing job. Continental 1 Deep Test, on the Galt Brook dome, is redrilling with whipstock below 2,432 ft. Asphalt Base 1 is below 775 ft. after resetting 8-in. at 657 ft. to shut off water and gas.

The Tar Point 1, on the Tar Point anticline, encountered a gas blow at 7,069 ft. and is cementing casing preparatory to drilling in and testing. The 2 Quebec Oil is standing at 4,750 ft.

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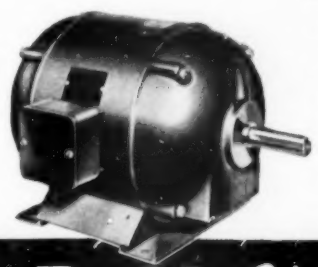

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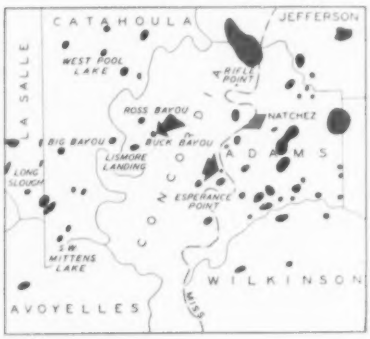
LOUISIANA

NORTH LOUISIANA

Buck Bayou Pool Is New Wilcox Discovery

Buck Bayou field was opened in Concordia Parish at Billups Bros. and Vasser & Brown 1 B. D. King et al, Section 1-6n-7e. The discovery flowed 163 bbl. of 39.1°-gravity oil per day from perforations at 5,310-15 ft. in the top of a 14-ft. net sand section of the King sand of the Wilcox. The new Wilcox discovery is located 3¼ miles east of Ross Bayou field in Concordia Parish.



Arrows indicate two new Wilcox oil discoveries in east-central Louisiana's Concordia Parish.

Wilcox Discovery Noted At Esperance Point

Justiss-Mears Oil Co. and Barnett Serio have a new indicated Wilcox oil discovery 1½ miles northeast of Esperance Point field in Concordia Parish at 3 Hugh Junkin et al. Operators have cemented production string and are preparing to perforate at the possible new pool opener or northeast extension to Esperance Point.

The nearest production is Esperance Point field. The well is located in irregular Section 1-5n-9e.

This section of Louisiana was the most active wildcatting area in eastern and northern Louisiana last year. The Parish lies on the Wilcox trend that extends through central Louisiana into southwestern Mississippi. Two new Wilcox oil pools were opened in the parish in 1952, Ross Bayou and Rifle Point. Concordia and neighboring Catahoula Parish recorded the most wildcat tests in northern Louisiana last year. Activity continues in the area at a rapid pace due to the stepped-up campaign for Wilcox production. The area lies just west of prolific Adams County, Mississippi, where three new oil pools have been opened this year, and 13 in 1952.

New Pay Indicated in West Springhill Area

A new pay sand is indicated at John B. Stephens and A. O. Phillips 1 W. A. Griffin, C NW SE SW 2-23n-11w, Webster Parish. The new indicated pay is a sand in the Tokio, lower than that found in the other wells of the field. A core from 3,144-48 ft. recovered 1 ft. of shale and 3 ft. of oil sand. Recovery on a drill-stem test at 3,138-48 ft. was 1,200 ft. of oil and 30 ft. of water-cut mud.

An offset to the indicated strike has been

staked at 2 W. A. Griffin, C SW SE SW 2-23n-11w, a southwest diagonal offset. Springhill was northern Louisiana's most significant discovery of 1952. Development in the field has been at a steady pace since its opening in the winter of 1952. The two pay zone field extends into Columbia County, Arkansas.

In March the Hill sand became a new pay in Springhill field. There are more than 30 wells producing on the Arkansas side of the field, all from the Tokio. Tokio production on the Arkansas side of the field has practically been defined. A new pay in the field would give impetus to continued steady development of this rapidly growing producing area, particularly on the western side of the reservoir. Daily allowable in the Louisiana portion of Springhill is 3,049 bbl. Monthly production on the Arkansas side of the field is running over 50,000 bbl.

SOUTH LOUISIANA

Cameron Parish Discovery Has 14,000-ft. Production

Discovery of another deep gas-condensate field on the large Rockefeller Game Reserve in southern Cameron Parish has been made by Superior Oil Co. at its 1 State Lease 2039-Rockefeller. From sand, opposite which casing is perforated at 14,000-20 ft., the well flowed 109.66 bbl. of 45.7°-gravity distillate with 8,450,000 cu. ft. of gas per day through 22/64-in. choke. Flowing pressure gaged 3,550 psi. Hole was drilled to 14,542 ft., and has casing run to bottom.

Location of the discovery is about 3½ miles south of Superior's Deep Lake field, also on the reserve.

MISSISSIPPI

Another Warrior Wildcat Gets Chester Gas Shows

Indications of another field for the northeastern Mississippi portion of the Black Warrior basin have been given by promising showings encountered by a rank wildcat Carter Oil Co. is drilling in western Chickasaw County.

The wildcat, 1 Fowley-Langley Unit, located in the C SE SE 22-13s12e, recovered broken sand with oil stain and gas odor in cores at 3,533-83 ft. in the Chester-Sanders zone. A drill-stem test taking in the section from 3,510 ft. had gas at the surface in 30 minutes, flowing through ⅝-in. bottom and ⅜-in. top chokes.

Flowing pressure, however, was only 2 psi. at the surface and 75 to 100 psi. at bottom. Tester was open 3 hours, and when closed the pressure built up to 800 psi. in 15 minutes.

Some showings also were encountered in the Abernethy zone, topped at 3,625 ft. Hole is being deepened.

Location of the wildcat is approximately 15 miles northwest of Carter's recently completed Trebloc gas-discovery well in the southeastern part of the county, and about 12 miles southwest of Vaughey & Vaughey's late Coleville gas discovery in the northeastern part of the county. The latter two discoveries, the third and fourth, respectively, in the basin during the past 15 months, produce from the Chester-Evans zone.

In the meantime, Carter is continuing production tests at its 1 McFadden, another prospective gas-discovery well for the basin, located basinward in northeastern Clay County, which adjoins Chickasaw County on the south. This test, with prospective pay zones at much greater depths than in the other discovery wells to the north in Chickasaw County, has casing perforated at 9,304-11 ft. and 9,332-64 ft. in the Chester-Lewis zone.

ROCKY MOUNTAIN

COLORADO

Morgan Strike

Falcon Seaboard Drilling Co. recovered gas in commercial quantities on two tests of "J" sand intervals at 1 Snodgrass, NW NE NW 20-1n-37w, Morgan County. The interval 5,543-55 ft. made gas in 2 minutes and flowed at the rate of 4 million cu. ft. per day on 30-minute test. On test of the zone 5,542-62 ft. the flow was gaged at 8 million cu. ft. per day. Total depth of the wildcat was 5,810 ft. and some 20 ft. of "J" sand appeared productive on the basis of cores cut in the well. The discovery is of importance because of its location on the south end of the Fort Morgan arch where there has been no previous success and very little previous drilling.

Adams County Discovery Completed

Forest Oil Co. has completed 1 Causey, NE SW NW 23-2s-57w, discovery well in the Badger Creek area of Adams County for gage of 213 bbl. of oil per day on pump. The well produced from the "D" sand, and is about 4 miles southwest of Little Beaver field in Washington and Adams counties. The Little Beaver area and the activity which has sprung up in the Badger Creek area since announcement of shows there is at present responsible for making the area one of the most active in the entire state.

NEBRASKA

Magnolia Is Completing Kimball County Discovery

Magnolia Petroleum Co. is preparing to complete at 1 State, SW SW NW 16-12n-57w, a wildcat west of Long field in Kimball County. Test of the zone 6,937-45 ft. made 900 ft. of oil with some water-cut mud in 2 hours. Total depth was 7,032 ft., and test was of "J" sand.

Deuel County Gas Discovery Is Commercial

Sherrod & Apperson of Tulsa have landed casing at 3,326 ft. in 1 Kontny, SW SW SW 10-13n-43w, Deuel County after recovering gas at the rate of 1½ million cu. ft. per day from the "D" sand interval 3,270-3,302 ft. The wildcat was drilled to 3,500 ft., with no shows logged in the "J" sand. It is about 3 miles northwest of Big Springs gas field.

NORTH DAKOTA

Location Made For Divide County Test

Spartan Drilling Co. has made location for a wildcat 22 miles north of production in Tioga field, and will drill the first wildcat of the current Williston basin campaign in Divide County. The well is 1 Noonan, SW

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NE 11-162n-95w, about 2½ miles southeast of the town of Noonan.

First Keene Area Producer Completed

Amerada Petroleum Corp. has completed the first producer in the Keene area of McKenzie County. The well, 1 Wollan, C NW NW 15-152n-96w is the third drilled in the area. Initial production was a flow of 36 bbl. of oil daily through half inch choke from the Madison lime. The well was produced for 3 hours and shut in for 21 during the period of completion tests.

MONTANA

Shell Begins Test Operations At Cabin Creek Discovery

Shell Oil Co. has perforated three zones believed to be in Red River of Ordovician age at the 22-33 Unit, NW SE NW 33-10n-58e, Fallon County, and unconfirmed reports indicate that the well flowed at the rate of 900 bbl. of oil daily during the last 4-hours of a 24-hour test on which the total flow was 400 bbl. The well was not acidized prior to testing, a distinct contrast with other Cedar Creek anticline wildcats where acidization has customarily been required.

Shell has not released data on the tests, and the gages reported are unofficial. The operator has also not released formation tops, but has reported the intervals perforated as 8,912, 8,833-84, and 8,688-8,760 ft., all with four holes per ft.

Commercial pay was found on drill-stem tests in Charles, Mission Canyon, Devonian and Silurian in addition to Ordovician, and the well has more than 1,000 ft. of apparently productive section. Good recoveries of oil were made on drill-stem tests of various intervals from upper Charles through Ordovician. Observers expect the well to prove capable of the best production of any wildcat yet drilled in the Williston basin. Shell will continue to perforate and test the hole.

Richland County Deep Test Flows

The first 24-hour production test of Sun Oil Co. and Phillips Petroleum Company's joint deep discovery at 1 Dynneson, C SW NE 32-24n-58e, northwest of Sidney in Richland County flowed 206 bbl. of oil from Ordovician between 12,585-605 ft. Test was without acidization or other treatment. Flow during the test was reported by the operator as intermittent, with some plugging of perforations by mud blamed for the interruptions. The well was not swabbed prior to testing, and had been permitted to flow to pits for clean up.

The Sun-Phillips discovery has been watched since first shows with much interest since it is the first significant test of a large eastern Montana portion of the Williston basin. It has set two records for the area. It is the deepest well ever drilled in Montana, and is also the first Williston basin deep test on a geophysical feature away from surface structures to recover oil in commercial quantities.

Production from the present depth is the deepest to date in the basin. Previous depth of production records were held by deep wells in the Beaver Lodge-Tioga area of North Dakota.

In addition to the Ordovician, now being tested, a substantial Mississippian section will be acidized and test.

Shell Has New Pay At Southwest Richey

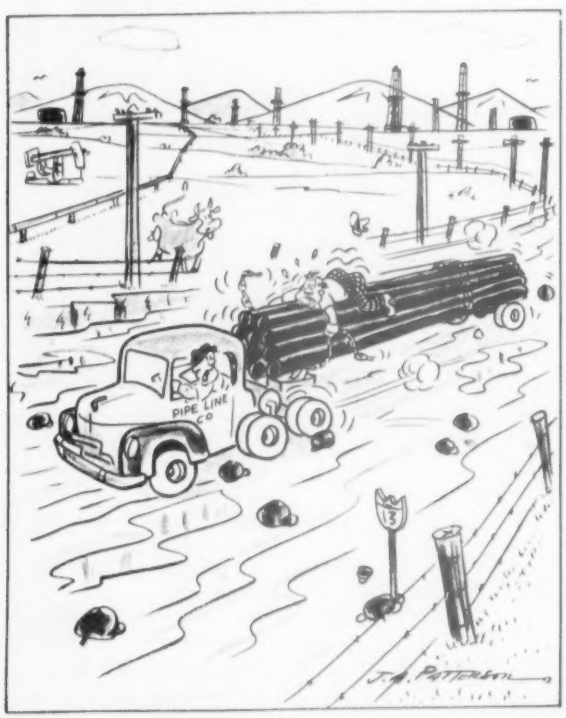
Shell has tested an apparent new pay at 22-33B NPRR, C SW NE 33-22n-48e in the southwest Richey area of McCone County. The well is an offset to the Silurian discovery in this area. It had commercial shows in this formation, and in addition recovered 1,378 ft. of muddy, gassy oil, 130 ft. of gassy mud, and 100 ft. of gassy, muddy water on 2½-hour test of the zone 9,605-94 ft., apparently in Ordovician. Tool was open for 2½ hours. Shell is drilling ahead below 9,932 ft. at the wildcat.

CALIFORNIA

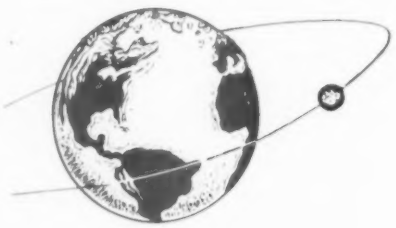
Paloma Deep Test Sets New California Depth Record

If all goes well a new California depth record probably will have been established last week by Ohio Oil Co.'s deep test in Paloma field, 15 miles southwest of Bakersfield. At the first of the week its 72-4 K.C.L.A. was drilling at 18,725-ft., only 9 ft. short of the 18,734-ft. record established by Superior Oil Co. 1 Limoneira in 1949.

Unless mechanical or hole difficulties are encountered it is expected the test will be carried below 20,000 ft. to make a thorough test of Eocene possibilities underlying the unit-operated field. Under way since October



"Can you hold on for a few more miles, Gus?"



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11	More than 20
34	More Than 15
26	More Than 10
123	More Than 5
Total 194	More Than 2200

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1951, the test is being drilled with a company rig. Currently hole is being made at the rate of about 25 ft. daily.

New Mountain View Pool Extended

First outpost to the Nozu sand (lower Miocene) discovery of M.J.M.&M. Oil Co. on the west edge of Mountain View field appeared it would be successful. On a formation test at 7,284-7,354 ft., the company's 48 Atlantic-Bradley yielded a net rise of 4,865 ft. of 30-32°-gravity clean oil. Following the test the operator ran 7-in. casing to 7,275 ft.

The outpost is about ⅓ mile northwest of the deeper-zone discovery well, 3 Wible in NW NE 23-30s-28e. Standard Oil Co. of California was nearing the pay at an east offset to the discovery and Hancock Oil Co. was deepening two northern offsets which originally were completed in a 5,400 ft. sand.

New Locations Trailing

Notices to drill new wells filed with the Division of Oil & Gas last week trailed those of a year ago for the first time since early this year. According to the division's compilation, 956 notices had been filed as compared with 965 at the same date a year ago. For the week ended May 9, 41 notices were filed of which 30 were development wells and 11 were for wildcats.

Second Oxnard Test Started

Standard Oil Co. of California has started a second deep test in Oxnard field, coastal Venture County. The new wildcat, 1 Scholle-Livingston, is in SW SW 32-2n-21w, about 1 mile northeast of its 1 McInnis.

The latter is believed to have encountered good oil shows in the Sespe while drilling above 6,000 ft. last February. The test was drilled to 9,525 ft. to test deeper possibilities and encountered a fishing job. With 9⅝-in. casing set at 4,999 ft., hole has been plugged back to 5,006 ft. and preparations made to resume drilling.

ARKANSAS

Union Wildcat Has Cotton Valley Show

A Union County wildcat, Leonard W. Phillips 1 Clemmie M. Bishop, C NE SE 25-16s-17w, is drilling ahead at 5,200 ft. after testing oil from the Cotton Valley. The wildcat is located 2½ miles northeast of Lisbon. A test from 4,438-53 ft. recovered 270 ft. of free oil. A second test at 4,440-66 ft. recovered 20 ft. of oil-cut mud, 275 ft. of oil, and 15 ft. of oil-cut mud with slightly salty taste.

New Pay At Irma

Ranney Exploration Co. has a new pay discovery in Nevada County's Irma field area at 1 J. D. Reynolds, C SW SE SW 31-13s-20w.

Production is from 3,016-22 ft. in the lower of three Travis Peak sands. The discovery lies ⅜ mile north of Nacatoch sand oil wells in Irma field.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS

Aransas County: C. G. Glasscock and Humble Oil & Refining Co. 1 State, Tract 11, Copana Bay. Dry. TD 7,200 ft.

Atascosa County: Alaska Steamship Corp. 1 Smith, Theodore Ellison Sur. 201, A-238. Dry. TD 2,850 ft.

Paul J. Moore and Hood Brothers et al 1 Edna, Catarina Sur. 45½. Dry. TD 2,015 ft.

Bastrop County: Jack Clark and J. E. Smith 1 S. B. Smith, J. A. Navarro Sur. Dry. TD 1,776 ft.

Bexar County: Elliott, Laub & Hill 1 Pallye Edwards, J. M. Martinez Sur. 104, A-466. Dry. TD 2,483 ft.

J. S. Hair 1 Scroggins, Juan Montes Sur., A-11. Dry. TD 750 ft.

Caldwell County: H. L. Hunt 1 Westbrook, C. S. West Sur. Dry. TD 5,000 ft.

* Cameron County: Texas Gulf Producing Co. 1 Garcia, Potero de Santa Isabel Grant A-1. IP 4,200 M.c.f. daily, open flow, Miocene 7,315-25 ft. (casing perforations). TD 10,537 ft. (New field—West Port Isabel).

* Duval County: John F. Camp 1 Miller, Diego Hinojosa Grant. IP 36.44 BOPD, 12/64-in., 38°, casing perforations 3,779-80 ft. TD 3,797 ft. (New field—Miller Duval).

J. W. Gorman 1 Antonio Lichtenberger, B&B Sur. 592, A-1752. Dry. TD 3,008 ft.

Sik Katz et al 2-A W. R. Peters Est., Bartolo Garcia 40, A-1721. Dry. TD 4,272 ft.

Edwards County: Sinclair Oil & Gas Co. 1 Miers, Menard County School Ld. Sur. 3. Dry. TD 6,255 ft.

Frio County: Forest Oil Corp. 5 Halff &

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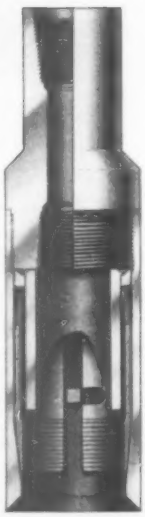

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J. C. Mayne, Alberta Supervisor, and W. A. Hyndman, Manager, Calgary Branch, watch drilling mud flowing over a shale-shaker.

F. J. C. Caine, Manager, Edmonton Branch (right), during a visit to a well-head "Christmas Tree".

Mr. Mayne (right) confers with A. D. Insley, Manager, Oil & Gas Department

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WILDCAT COMPLETIONS

Oppenheimer, J. Martinez Sur. A-917 and A-494. Dry. TD 4,075 ft.

Howeth & Mason 1 Berry, BS&F Sur. 637, A-152. Dry. TD 3,737 ft.

*Shell Oil Co. 1 Roche, J. J. Thompson Sur. 14, A-1395. IPP 40 BOPD, open hole 3,540-56 ft. (Extends Big Foot field.)

Gonzales County: Producers Corp. of Nevada 1-A Johnston, W. T. Williams Sur., A-482. Dry. TD 1,982 ft.

McMullen County: Alaska Steamship Corp. and Newman Brothers Drilling Co. 6-AA South Texas Syndicate, J. Fitzpatrick Sur. 14. Dry. TD 4,337 ft.

Jack Kins 19-B Lark, Michael O'Boyle Sur. A-7. Dry. TD 942 ft.

Menard County: Deep Rock Oil Corp. 2 Bevans et al, John H. Gibson Sur. 3, A-347. Dry. TD 3,535 ft.

* Nueces County: Austral Oil Exploration Co., Inc. 1 State, Tract 20, Corpus Christi Bay. IP 7,900 M.c.f. daily with 43 BC per M.M.c.f. open flow, casing perforations 8,603-11 ft. TD 8,772 ft. (New field—Corpus Channel.)

* San Patricio County: Sun Oil Co. 1-A Broughton, C. C. Hornsby Sur. IP 10,200 M.c.f. daily, Vicksburg 9,034-39 ft. (casing perforations). TD 9,600 ft. (New field—Broughton.)

Starr County: Karl Michel 1 Florencio Guerra, Survey 360, Porcion 109. Dry. TD 1,862 ft.

Webb County: Killam & Hurd 2 Bruni, Survey 3. Dry. TD 965 ft.

Magnolia Petroleum Co. 1-A Billings Ranch, CCSD&RGNG, Section 31, Dry. TD 2,894 ft.

Wilson County: Hankamer Investment Co. 1 Longley, James Bradley Sur. 342, A-47. Dry. TD 4,604 ft. Elev. 565 ft., chalk 4,025 ft., Edwards 4,411 ft.

* Zapata County: Delhi Oil Corp. 2 Ildefonso Ramirez, Porcion 18, Certificate 6590. IP 1,760 M.c.f. daily, open flow, Wilcox 9,607-20 ft. (casing perforations). TD 9,787 ft.

Killam & Hurd 4 Bruni Est., Borrego Grant, Dry. TD 1,917 ft.

A. M. Lacey 1 Ninfa Martinez, Blas Maria Grant. Dry. TD 3,550 ft.

TEXAS GULF COAST

Bee County: Gasoline Production Corp. et al 1-B Holzmark, Sam May Sur., A-230. Dry. TD 8,565 ft.

* Brazoria County: C. M., V. M., and P. M. Frost 1 Fee, Andrew Robinson Sur., A-125. IP 149 BOPD, 12/64-in., 26°, casing perforations 6,324-26 ft. TD 6,332 ft. (New pool in Lockridge area.)

* Calhoun County: Humble Oil & Refining Co. 1-State, Tract 54, Matagorda Bay. IP 45,000 M.c.f. daily with 31 BD per million, open flow, 59.4°, casing perforations 8,455-66 ft. TD 8,803 ft. (New field-South Sand Point area.)

DeWitt County: Holmes Drilling Co. and Amnoce Tools, Inc., 1 Gohmert et al, T & NO RR Sur., A-551. Dry. TD 8,020 ft.

Fort Bend County: Grace Oil Co. 1 Rabb et al, Thomas W. Thompson Sur., A-335. Dry. TD 10,405 ft.

Goliad County: Monterey Exploration Co., Inc., and Kirkwood & Co. 1 Ray, Cuafrilla Irrigation Co. and Pedro Trevino surveys (1½ miles west of North Hords Creek field). Dry. TD 7,501 ft.

Hardin County: British-American Oil Producing Co. 1 J. J. Settegast estate, H & TC Sur. 233, A-640. Dry. TD 9,355 ft. in Wilcox. Elev. 103 ft., Cockfield 5,937 ft., Wilcox 9,066 ft.

Harris County: H. C. Cockburn 1 Harris County-Houston Ship Channel, Harris & Carpenter Sur., A-28. Dry. TD 7,259 ft.

Clay Harrell et al 1 Shivers, Stafford Smith Sur., A-1359. Dry. TD 8,012 ft.

Floyd L. Karsten 1 Hurt, K. Morgan Sur. A-573. Dry. TD 8,015 ft.

Jackson County: Sam G. Harrison 1 Mauritz et al, John Davis League, A-16. Dry. TD 6,685 ft.

* Jefferson County: Adams & Haggerty 5-F Fee, T & NO Sur. 174, A-493. IP 225-83 BOPD, ⅛-in. choke, 33.7°, casing perforations 7,634-95 ft. TD 7,814 ft. (New pay in Big Hill field.)

Jefferson County: J. C. Chance Well Service, Inc., 1 Parsons, D. Easley Sur. A-20. Dry. TD 6,809 ft.

Meredith, Clegg & Hunt et al 1 Broussard, S. R. Wilson Sur. (Hille Brandt Bayou area). Dry. TD 8,250 ft.

Rowan Oil Co. 1 Wingate et al, Stephen Eaton Sur. A-21. Dry. TD 8,640 ft.

Karnes County: Saboard Oil Co. of Delaware 1 Preciliano Tamez, Moses F. Roberts Sur. 2, A-256. Dry. TD 5,402 ft.

Live Oak County: George S. Hammonds 1 Heinen, Richard Everett Sur. Dry. TD 2,008 ft.

Francis J. Haynes 1 Lindbloom, J. M. Dobie Sur. 62, A-943. Dry. TD 3,743 ft.

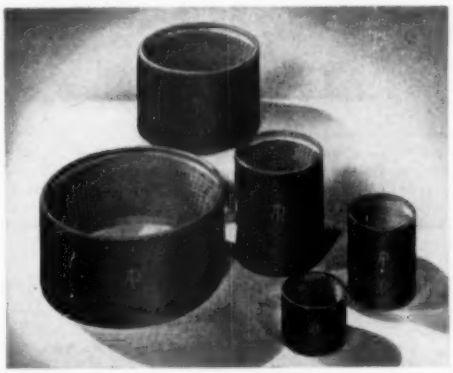
Montgomery County: Austral Oil Exploration Co., Inc., 1 Patten Davis, William Wills Sur. A-594. Dry. TD 7,720 ft.

Newton County: Tennessee Production Co. 1 Gladys Price estate, L. Miller Sur. 8, A-1226. Dry. TD 6,925 ft.

Polk County: Continental Oil Co., W. T. Carter & Brothers, and Carlton D. Speed, Jr., A. Morales Sur. A-52. Dry. TD 10,522 ft.

Jack W. Frazier et al 1 Crain estate, Isaac Parker Sur. A-61. Dry. TD 3,853 ft.

Refugio County: Sam E. Wilson, Jr., 3-F



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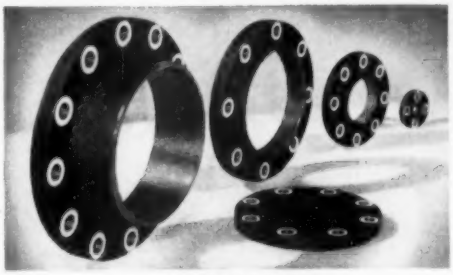

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WILDCAT COMPLETIONS

Jamie Hynes, John Malone Sur. A-46. Dry. TD 8,134 ft.

San Jacinto County: Sunray Oil Corp. 1 LeMay, W. G. Logan Sur. A-24. Dry. TD 7,850 ft.

Wharton County: G. S. Hinkle and C. B. Webster et al 1-A Northington, John P. Borden Sur. A-9 (Mentor area). Dry. TD 7,512 ft.

* Texas State Drilling Co. 1 Hall, J. B. Morford Sur. A-524. IP 118.25 BOPD, 7/64-in., 41°, casing perforations 6,276-82 ft. TD 6,520 ft.

* Tide Water Associated Oil Co. 1 Boettcher, John F. Stephenson Sur. A-415. IP 3,800 M.c.f. daily, Yegua 7,554-80 ft. (casing perforations). TD 8,019 ft.

EAST TEXAS

Cherokee County: Bill R. Tipton 1 Southern Pine, L. C. Luckell Sur., A-1031. Dry. TD 5,385 ft.

Hancock Oil Co. 1 Southern Pine, Z. Gibbs Sur., A-21. Dry. TD 5,745 ft.

Houston County: J. E. Snoddy 2 G. T. Lundy, John Forbes Sur. Dry. TD 3,260 ft.

Leon County: Laan-Tex Oil Co. 1 Edward F. Swift, William Palmer Sur. Dry. TD 6,771 ft.

Limestone County: Cities Service Oil Co. 1 Ida Baird, Sarah McNulty Sur., A-751. Dry. TD 4,345 ft., elev. 480 ft., Woodbine 3,875 ft., Comanche 4,316 ft.

TEXAS PANHANDLE

Ochiltree County: Lewis W. Welch 1 M. L. Brillhart, 926-43-H&TC, 2 miles SE Perryton. Dry. TD 10,568 ft., elev. 2,190 ft., Douglas 5,304 ft., Lansing 5,728 ft., Kansas City 6,450 ft., Des Moines 6,925 ft., Chester 8,058 ft., Osage 9,325 ft., Viola 10,027 ft., Simpson 10,236 ft., Ellenburger 10,363 ft.

WEST CENTRAL TEXAS

Callahan County: L. A. Hedrick 1 Oscar Rose, 10-8-SPRR. Dry. TD 4,502 ft., elev. 1,934 ft., Caddo 4,359 ft.

Sorrells Oil Co. 1 L. H. Owen, S. J. Robinson Sur., A-296. Dry. TD 4,243 ft.

* Colemn County: A. L. Andree 1 Mrs. B. Yarbrough, Sec. 743, B. Ferguson Sur. IPP 40 BOPD, sand 2,308-13 ft. TD 2,351 ft.

Perry Greenspan 1 McCreery Ranch, Sec. 21, J. S. Martin Sur. Dry. TD 2,250 ft.

H & L Exploration Co. 1 Tom Connelly, W. H. Black Sur. 278. Dry. TD 1,890 ft.

J. J. Lynn Oil Division 1 V. M. Close, Sec. 1, H&GN. Dry. TD 3,115 ft., elev. 1,858 ft., Caddo 3,100 ft.

* Kenneth J. Rich 3 P. H. Pettway, Blk. 8, Pleasant Young Sur. 494. IPP 61 BOPD, 42°, sand pay 1,311 ft. TD 1,340 ft.

James H. Snowden 1 J. M. Bell, J. P. Diell Sur. 719. Dry. TD 2,662 ft.

Westates Petroleum Corp. of Texas 1 Ray Jameson, 7-2-GH&H. Dry. TD 3,773 ft.

Eastland County: Dave Rubin 1 Walter Mitchell, Wm. F. Flint Sur., A-131. Dry. TD 3,425 ft.

Fisher County: R & R Drilling Co. 2 W. F. Martin, 113-1-H&TC. Dry. TD 5,600 ft., elev. 1,894 ft., reef 5,372 ft.

B. A. Duffy 1 J. C. George Estate, Sec. 6, Blk. E. Dry. TD 4,160 ft.

Haskell County: Bridwell Oil Co. 3 T. G. Hendrick, Sec. 103, Indianola Sur. Dry. TD 1,844 ft.

Sojourner Drilling Co. 2-A Clark, 90-1-H&TC. Dry. TD 3,205 ft.

Texas Pacific Coal & Oil Co. 2 Avis Lynch, 6-14-H&TC. Dry. TD 5,076 ft.

Jones County: Cascade Petroleum Co. 1 City of Abilene, Z. B. Bucholtz Sur. 16. Dry. TD 2,495 ft.

L. A. Hedrick 1 C. M. Sayles, 49-16-T&P. Dry. TD 3,080 ft.

Clyde Nelson 1 Bertie Christopher, 3-2-T&NO. Dry. TD 2,000 ft.

Sojourner Drilling Co. 1 Marie Thompson, 6-4-H&TC. Dry. TD 3,775 ft.

J. F. West 1 Joe C. Nowlin, Sec. 2, BBB&C. Dry. TD 2,806 ft.

R. Clay Underwood 1 R. H. Gaudlin, L. P. Elder Sur., A-1474. Dry. TD 2,505 ft.

Shackelford County: J. J. Lynn 1-A Hendricks, Sec. 179, ETRR. Dry. TD 1,810 ft.

Schkade Bros. Drilling Co. 1 R. M. Kelley, 61-14-T&P. Dry. TD 1,808 ft.

* Stonewall County: Esperado Mining Co. 1 R. W. Bissett, 60-F-H&TC. IPP 139 BOPD, 36°, pay 5,546 ft. TD 5,557 ft.

Taylor County: W. E. Butler 1 A. J. Brewster, BBB&C Sur. Dry. TD 4,721 ft.

NORTH TEXAS

Archer County: Ace Drilling Co. 3 Bertha Mingle, Lot 40, Blk. 4, Clark & Plumb. Dry. TD 916 ft.

J. Earle Gray 1 Jack Marvin-Bloodworth, Blk. 12, BBB&C, A-936. Dry. TD 1,307 ft.

Miami Operating Co. 1 C. C. Bloodworth, McKinney & Williams Sur., A-312. Dry. TD 5,267 ft.

* Clay County: L. T. Burns 1 O. Munkres, 3-A668-T&NO. IP 99.5 BOPD, 14/64-in., pay 6,239 ft., TD 6,260 ft.

S. D. Johnson 1-B Gains, Henry Dixon Sur., A-106. Dry. TD 4,241 ft.

* Jack County: McMahon-Bullington 1-S W. B. Bryant, H. H. Fuquay Sur. IPP 1.4 BOPD, pay 388 ft. TD 409 ft.

Montague County: Jack Grace Production

YOUR U. S. A.

Many windy politicians have been screaming that the people—you and I—are to blame for all the ills that have befallen America. We're responsible, they say, for inflation; high prices; extravagance in government; our bungling foreign policy; disarmament; the war in Korea; the ammunition shortage, and our vulnerability to A-bomb attack. Some of them shout for price controls; a wage freeze; rationing and a lot of other silly things to punish us and bring us to our senses.

Many of these vociferous gentlemen have sat in the House or Senate like little mice, through ten to twenty years of unprecedented government waste, debauchery and gross mismanagement, too frightened, too ignorant, or maybe too satisfied to open their mouths.

It would be a good idea if fifty or sixty million of us guilty saboteurs would drop them a line to let them know that *WE KNOW* just where the blame belongs—then render a verdict the next time we go to the polls.

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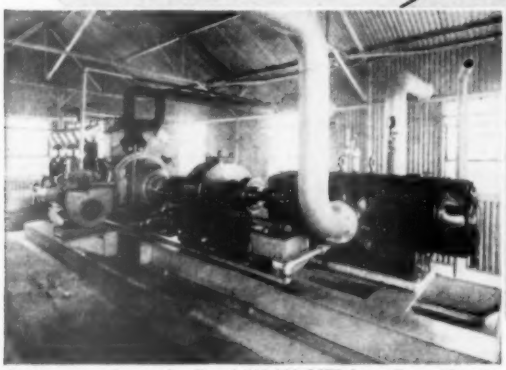
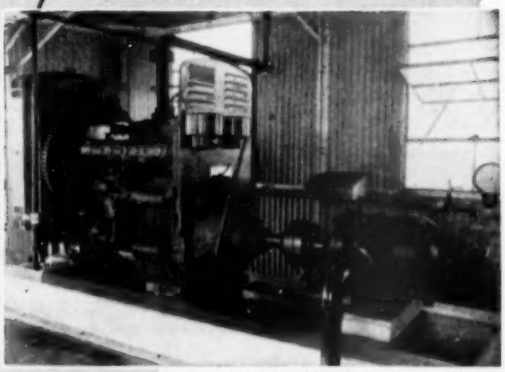
Five two-stage gas boosters, each handling 1,770,000 SCFD from 10—to 120—psig, at 800 rpm, direct connected to V-12 Climax gas engines.

FULLER ROTARY COMPRESSORS



Single-stage gas booster handling 3,560,000 SCFD from 15—to 45—psig, driven by V-12 Climax gas engine through gear speed reducer.



Single-stage gas booster handling 2,400,000 SCFD from 150—to 250—lb. psig, at 870 rpm, direct connected to Waukesha gas engine.

Oilmen in Texas invest in the FULLER ROTARY COMPRESSOR

For extra gas boosting to plant or trunk level, Fuller Rotary Compressors can be spotted along gathering or supply lines where they operate efficiently, under the most adverse conditions, without constant supervision.

Fuller Compressors require little maintenance because only the rotor, blades and bearings move. No valves to leak or seats to grind. Blades automatically compensate for wear . . . maintained capacity for the life of the machine. Pulsations and vibrations are reduced to a minimum. For the most efficient, economical way to boost pressures, install the Fuller Rotary Compressor. Write for Bulletin C-6, now.

Fuller compressors are available in a range of cylinders up to 3300 c.f.m. (at atmospheric intake) at normal speeds, with a reasonable variation in speed range—motor, engine, or turbine drive.

Fuller

FULLER COMPANY, Catasauqua, Pa.
Chicago 3—120 So. LaSalle St.
San Francisco 4—420 Chancery Bldg.

PIONEERS OF HIGH-EFFICIENCY VANE-TYPE ROTARY COMPRESSORS

C-226

WILDCAT COMPLETIONS

Co. 1 J. K. Seibold, W. Edwards Sur., A-227. Dry. TD 9,100 ft.

Star Oil Co. 1 Lois Martin, Blk. 140, Jose Alabarri Sur., A-579. Dry. TD 6,502 ft.

Wilbarger County: Thomas C. Canan 1-A Waggoner, 10-5-H&TC. Dry. TD 2,500 ft.

W. A. Lofton 1 Waggoner, 34-4-H&TC. Dry. TD 2,015 ft.

Young County: Darden & Terry 1 John Parsley, Blk. 224, TE&L Sur. Dry. TD 985 ft.

Darden & Terry 2 Parsley, Blk. 224, TE&L. Dry. TD 986 ft.

Henry Grace Production Co. 2 Graham Stewart, Taylor Rose Sur., A-1653. Dry. TD 3,850 ft.

Moncrief & Eddleman Oil Co. 1 W. L. Wainscott, Blk. 285, TE&L, A-532. Dry. TD 2,987 ft.

WEST TEXAS

Brewster County: C. D. Hubbard and H. H. Sasser 2 L. L. Hess Estate "B," 18-4-GC&SF. Dry. TD 150 ft.

Crockett County: William Y. Penn 1 Superior-Shannon, 16-2-GC&SF. Dry. TD 3,000 ft.

Runnels County: Low Drilling Co. 1 Cicero Smith, C. F. Baumlin Sur. 343. Dry. TD 5,109 ft., elev. 1,738 ft., Ellenburger 4,821 ft.

J. J. Lynn 1 Crockett, Truitt TWP Sur. Dry. TD 4,183 ft.

* Columbian Fuel Corp. 3 Val I and J. T. Billups, Wharton CSL Sur. 509. IP 2 BOPD, 24/64-in., pay 3,640 ft. TD 4,359 ft.

Schleicher County: Hunt Oil Co. 1 R. A. King, 8-K-GC&SF. Dry. TD 4,646 ft.

Sutton County: J. Paul Karcher 1 Sol Mayer, 2-C-GC&SF. Dry. TD 674 ft.

Terrell County: Plymouth Oil Co. 5 L. H. Hicks-State, Sec. 12, CCSD&RGNG. Dry. TD 1,771 ft.

Tom Green County: Murphy Co. 2 E. H. Jones, Anton Lutenberg Sur. 759. Dry. TD 248 ft.

John Odstrcil 2 E. D. Jones, J. C. Helbo Sur. 258. Dry. TD 300 ft.

Sun Oil Co. 1 Robert Neill, J. Thornton Sur. 26. Dry. TD 6,512 ft.

Upton County: Magnolia Petroleum Co. 1-B John Windham, 17-39-T5S-T&P. Dry. TD 11,467 ft., elev. 2,811 ft., Pennsylvanian 10,800 ft.

NORTHERN NEW MEXICO

* Rio Arriba County: Phillips Petroleum Co. 1-A Indian, SW NE NE 29-29n-3w. IP 428 M.c.f. gas daily, Mancos 5,888 ft. TD 5,939 ft.

ILLINOIS

Brown County: Chas. Measley 1 Manny, SW SE NW 19-1s-4w. Dry. TD 968 ft.

Christian County: S. D. Jarvis 1 Butcher, NE SE NE 21-15n-1w. Dry. TD 2,550 ft.

Clay County: Superior Oil Co. 1 Baity, SE SE SW 14-2n-5e. Dry. TD 3,023 ft.

Clark County: J. A. Hill 1 Blankenbecker, NW SE NW 14-9n-13w. Dry. TD 1,600 ft.

* Lawrence County: Bury Drilling Co. 1 DeBoeuf, NE SE NE 18-2n-1w. IPP 2 BOPD, Aux Vases sand 1,925-31, 1,987-91 ft. TD 2,077 ft.

H. C. Henderson 1 McKeown, NE NW NE 30-4n-11w. Dry. TD 1,400 ft.

Macon County: Sun Oil Co. 1 Damery, SW SW SW 5-15n-1e. Dry. TD 3,780 ft.

Madison County: F. Subre 3 Brandt, NW NW NE 6-5n-6w. Dry. TD 585 ft.

Washington County: Dale Hopkins 1 Koelling, NW SE SW 34-1n-1w. Dry. TD 1,558 ft.

White County: Calvert Drilling Co. 1 Camp, NW SW NE 21-3s-8e. Dry. TD 3,461 ft.

INDIANA

Gibson County: Cullum & Lawhead 1 Martin, SW NE NW 10-3s-10w. Dry. TD 2,163 ft.

Nash Redwine 1 Minnis, NE NE SE 29s-2s-9w. Dry. TD 1,880 ft.

KENTUCKY

Daviess County: Reat Day and Hugh Ward 1 Bedford Barrett, NW SW SE 16-O-32. Dry. TD 1,240 ft.

Henderson County: Slagter Production Co. 1 Cates, NE NE SW 21-P-22. Dry. TD 2,641 ft.

McLean County: R. E. Hupp 1 Collins, SE NE NW 2-M-28. Dry. TD 1,930 ft.

Hailon Park 1 Taylor, NW SW NW 21-M-29. Dry. TD 1,312 ft.

J. C. Miller and Ashland Oil & Refining Co. 1 Mackey, SW NE SE 10-N-25. Dry. TD 2,504 ft.

Muhlenberg County: Coy Oil Co. 1 Winn, SE SW NE 17-H-30. Dry. TD 1,125 ft.

Union County: W. F. Lacy 1 Clements, NW NE SW 7-O-20. Dry. TD 2,743 ft.

* Webster County: George L. Wrather 1 Wilson, NW SE NE 25-N-23. IPP 75 BOPD, Tar Springs 1,925-40. TD 2,740 ft. Extension to Wanmaker pool.

MICHIGAN

Allegan County: Sheldon-Stewart Co. 1 Wilson, NW NW NW 19-2n-12w. Dry. TD 1,511 ft. in Traverse.

Jackson County: Allied Investments, Inc. 1 Hatch & Mackenzie, NW NW NW 22-3s-3w. Dry. TD 1,644 ft. in Traverse.

WEST VIRGINIA

* Greenbrier County, Williamsburg district: Deep Rock Oil Corp. 1 Bertha H. Thornbury. Elev. 2,420 ft. IP 713 M.c.f. gas per day, rock pressure 2,200 psi., chert 6,323 ft., gas 6,343 ft., Oriskany sand 6,428 ft., gas 6,495 ft., Williamsport 7,372 ft., gas 7,386 ft. TD 7,490 ft.

ALABAMA

Baldwin County: I. P. and Fred La Rue 1 Tunstall, 49-2n-2e. Dry. TD 6,129 ft. Elev. 34 ft., chalk 3,440 ft., Eutaw 4,660 ft., marine Tuscaloosa 5,521 ft., Pilot sand 5,746 ft.

Monroe County: Fred T. Helms 1 McCreary, C SE SW 14-9n-9e. Dry. TD 4,509 ft. Elev. 262 ft., chalk 957 ft., Eutaw 2,142 ft., marine Tuscaloosa 3,200 ft., lower Tuscaloosa 3,320 ft., lower Cretaceous 3,710 ft.

MISSISSIPPI

Adams County: Sunnyland Contracting Co. 1 Geisenburger, 29-6n-2w. Dry. TD 6,612 ft. Elev. 361 ft., Vicksburg 2,138 ft., Cook Mountain 3,047 ft., Sparta 3,250 ft., Wilcox 4,455 ft., Parker 6,400 ft., Minter 6,560 ft.

Chickasaw County: Sinclair Oil & Gas Co. 1 Epperson, N½ SE SE NW 13-12s-3e. Dry. TD 2,970 ft. Elev. 429 ft., Eutaw 738 ft., Tuscaloosa 1,003 ft., Chester 1,335 ft., Millerella 1,712 ft., Carter 1,872 ft., Evans 2,558 ft., Lewis 2,666 ft., Iowa 2,720 ft.

Perry County: J. P. Evans, Jr., 1 McClain, C SW NW 36-5n-9w. Dry. TD 8,722 ft. Elev. 200 ft., Wilcox 2,268 ft., Massive 8,142 ft.

Wayne County: Vincent & Welch, Inc., 1 Board of Supervisors, 16-6n-7w. Dry. TD 6,553 ft. Elev. 321 ft., Vicksburg 830 ft.,

NOTICE OF GOVERNMENT SALE—OIL AND GAS LEASE

The General Services Administration hereby gives notice that it has available for lease under certain provisions of the Federal Property and Administrative Services Act of 1949, Public Law 152, the following property which has been declared surplus:

An Oil and Gas Lease on 232.83 acres, more or less, together with rights of exploration, drilling storage and removing same, being an area of Ward Island, bounded on the north by Corpus Christi Bay and on the sides by Oso Bay, being the same property acquired by the United States of America by condemnation in a proceeding in the District Court of the United States for the Southern District of Texas, Corpus Christi Division, styled "United States of America vs. Certain Land on Ward Island, Nueces County, Texas, B. Ray Smith, et al, Civil Action No. 217, filed 12-11-42. The surface estate in the land and improvements were transferred to the University of Corpus Christi for educational use. Lease will provide that exploration and/or drilling operations will be so conducted as not to interfere with the use and enjoyment of such facilities. Government to retain one-eighth (⅛) part of all oil, gas or other minerals produced from the leased premises.

The property has been screened against known defense and other requirements of the Federal Government, and has been declared surplus for disposal.

HOW, WHEN AND WHERE

This offering is open to all bidders on equal basis, no priorities involved. Bids will be received at the address shown below until 11:00 A.M., CST, June 19, 1953, at which time they will be publicly opened. Bids for Lease must be submitted in a sealed envelope plainly marked in the lower left hand corner as follows: "Sealed Bid, Disposal No. GSA-R-223, Opening date June 19, 1953, 11:00 A.M. CST."

Bids received which are not so identified may not be considered and may be returned to bidders. All bids must contain a certified check or postal money order, payable to the "Treasurer of the United States" representing a bid deposit in the amount of ten percent (10%) of the total amount of bid. No deposit shall be required in excess of $2,500.00.

This advertisement is not a basis for negotiation, and General Services Administration reserves the right to consider all bids in the light of applicable objectives of the Federal Property and Administrative Services Act of 1949, and to reject any or all proposals. Bids to lease must be for cash. The lease will be subject to a reservation to the United States of America of all fissionable material rights as provided for in Executive Order 9908, dated December 5, 1947.

Personal inspection of the property and the inspection of acquisition records, or other documents, may be arranged by contacting the Surplus Real Property Office, General Services Administration, 1114 Commerce, Dallas, Texas, or by calling Telephone STerling 5611, Extension 2333.

Required Bid Forms No. GSA-R-223 containing all of the terms and conditions of the lease and further information may be obtained by writing the office named below.

GENERAL SERVICES ADMINISTRATION

PUBLIC BUILDINGS SERVICE, REGIONAL OFFICE, 1114 COMMERCE STREET, DALLAS, TEXAS

Wilcox 1,768 ft., chalk 4,740 ft., Eutaw 6,032 ft., Tuscaloosa 6,552 ft.

SOUTH LOUISIANA

Orleans Parish: Richardson & Bass 1-H Humble-Faubourg de Montluzin, 1-11s-13e. Dry. TD 13,292 ft.

Plaquemines Parish: Gulf Refining Co. 2 Buras Levee District-State Unit, 16-23s-31e. Dry. TD 9,669 ft.

Richardson & Bass 46-S Delacroix Corp., 34-14s-12e. Dry. TD 12,576 ft.

St. Bernard Parish: The Texas Co. 1 State-Fox Bay, Township 13s-19e, in Fox Bay. Dry. TD 12,127 ft.

Terrebonne Parish: Stanolind Oil & Gas Co. B-1 South Shore, 2-18s-17e (2 miles northwest South Houma field). Dry. TD 12,810 ft.

Union Oil Co. of California 1 Continental, 56-17s-15e (Cocatriz area). Dry. TD 11,725 ft.

Vermilion Parish: Humble Oil & Refining Co. 1 State, Lease 2080, in West Vermilion Bay. Dry. TD 13,345 ft.

OKLAHOMA

* Beaver County: Aladdin 1 Cobb, C NE 16-6n-20eCM. IP 9,600 M.c.f. of gas per day, Morrow 6,162-95 ft. TD 6,450 ft.

Coal County: Harry H. Diamond, Inc. et al 1 Bailey, SE SW NW 6-2n-8e. Dry. TD 3,543 ft.

Creek County: Gulf Coast West 1 Holcomb "A," SE SW NE 19-18n-8e. Dry. TD 3,021 ft.

Garfield County: D&L Oil Co. 1 Price, SE SE NE 26-24n-3w. Dry. TD 5,055 ft.

Kay County: Walter Duncan 1 Williamson, SE NW SW 4-28n-2w. Dry. TD 4,527 ft.

* H. Waggoner Co. 1 Buesing, SW SW SE 32-27n-1e. IPP 50 BOPD, Mississippi chat 3,620-60 ft., 45°, TD 3,910 ft. (Oil discovery.)

Lincoln County: Earl Sadler 1 Webb, SE SE NW 28-12n-5e. Dry. TD 4,940 ft.

* Floyd C. Hubbel 5 Gumaer, SW NE NE 7--15n-5e. IPF 264 BOPD, Oswega 3,478-96 ft. TD 3,603 ft. (New pay at NW Kendrick pool.)

Nadel & Gussman 1 Remington, SE SE NE 22-16n-6e. Dry. TD 3,880 ft.

Logan County: Geo. Puckett Drilling Co. 1 Eggleston, SW SW NW 18-15n-1w. Dry. TD 6,097 ft.

McCurtain County: D. M. Sprinkle 1 McReynolds-Moreland, SW NE NW SE 21-7s-23e. Dry. TD 305 ft.

* McClain County: Jay Simmons and Mid-Continent Petroleum Corp. 1 Wilson, SE SE 14-8n-4w. IPF 411 BOPD, 49°, Tulip Creek 10,447-88 ft. TD 11,210 ft. (New oil pool.)

Noble County: Russell Cobb Jr. and D&L Oil Co. 1 Plumer, NW NW SW 31-20n-2w. Dry. TD 5,840 ft.

Osage County: Service Drilling Co. 1 Osage, SW SW SW 5-28n-6e. Dry. TD 3,008 ft.

Pawnee County: R. B. Funkhouser 1 Funkhouser, NW NE SW 10-22n-6e. Dry. TD 3,340 ft.

* Payne County: T. Blake Dirickson and D&L Oil Co. 1 Grother, SE SE SE 18-17n-5e. IPF 20 BOPD, 35°, lower Skinner 3,552-60 ft. TD 3,735 ft.

* Pontotoc County: W. A. Delaney, Jr. 1 Saylors-Hisle, NE NW SW 7-3n-7e. IP 10 BOPD, 25°, 1,126-34 ft. TD 1,800 ft. (Oil discovery.)

Robert L. Wheelock, Jr. et al 1 Dillon, SW SW SW 4-4n-4e. Dry. TD 2,342 ft.

* Pottawatomie County: Vaughn Producing and Amerada Petroleum Corp. 1 Settles, SW SW SE 6-5n-3e. IPF 120 BOPD, 35°, Layton 3,065-78 ft. TD 3,078 ft. (Oil discovery.)

* Seminole County: Blackwood-Nichols Co. 1 Jarvis, SE NW NE 8-10n-6e. IPF 432 BOPD, 45°, Gilcrease 3,862-70 ft. TD 4,687 ft.

Stephens County: Fleet Drilling Co. 1 McSpadden, SE NE SE 31-2s-4w. Dry. TD 7,515 ft.

* Sohio Petroleum Co.-Champlin Refining Co. 2 Ringer unit, SE NE SW 29-1n-4w. IPF 366 BOPD, 37°, 5,810-48 ft. TD 7,110 ft.

KANSAS

Barton County: Heathman & Co. 1 Heinz, SE SE SE 34-18s-11w. Dry. TD 3,408 ft.

G. Angle et al 1 Wood, NW NW SE 15-19s-13w. Dry. TD 3,460 ft.

L. Huff 1 Evers, NE NE SE 4-19s-14w. Dry. TD 3,585 ft.

Butler County: J. P. Gaty 1 Kiser, SE SE SW 3-27s-3e. Dry. TD 3,084 ft.

C. C. Nye 1 Wehrman, CNL NW SE 30-29s-8e. Dry. TD 2,773 ft.

Cowley County: H&M 1 Warren, SE NE NE 18-35s-5e. Dry. TD 3,224 ft.

Ellis County: Amerada Petroleum Corp. 1 Phillips, SE SW NE 11-15s-17w. Dry. TD 3,506 ft.

Finney County: Trans-Era 1 Rodgers, SE SE SE 7-22s-33w. Dry. TD 4,860 ft.

Graham County: Herndon Drilling Co. 1 Kenyon, NW NW NW 15-7s-21w. Dry. TD 3,706 ft.

Kingman County: Adair 1 McKenna, SE NE NE 8-27s-10w. Dry. TD 4,540 ft.

Norton County: Jones, Shelburne, Farmer 1 Peak, SW SW SW 35-4s-22w. Dry. TD 3,675 ft.

Osborne County: Sohio Petroleum Co. 1 Kreft, SW SW NW 22-9s-15w. Dry. TD 3,928 ft.

Pratt County: Morrison 1 Hartman, SE SW NE 21-26s-11w. Dry. TD 4,520 ft.

* Champlin Refining Co. 1 Henderson, SW NE NW 11-26s-14w. IPP 28 BOPD, Simpson 4,360-66 ft. TD 4,500 ft.

Rice County: El Dorado 1 Hooker, NE NE NE 21-18s-8w. Dry. TD 3,501 ft.

Rooks County: L. Phillips et al 1 Fregeau, NW NW NE 7-9s-19w. Dry. TD 3,599 ft.

Stafford County: Walters 1 Ring, NW NW NE 17-23s-12w. Dry. TD 3,892 ft.

G. W. Speer 1 Eidson, SE SE NW 25-23s-13w. Dry. TD 3,945 ft.

Toklan Production Co. 1 Van Sickle, NE NE SE 26-25s-12w. Dry. TD 4,322 ft.

Helmerich & Payne 1 Neill, SE SE NE 5-25s-14w. Dry. TD 4,450 ft.

Trego County: C&G 1 Benson "A," NE NE SE 16-12s-22w. Dry. TD 4,124 ft.

NEBRASKA

Cheyenne County: James P. Sloss 1 Terman, NW NW SW 4-13n-52w. Dry. TD 5,687 ft.

Anderson-Prichard 1 Regnault, NW NE NW 6-14n-48w. Dry. TD 4,700 ft.

Ohio Oil Co. 1-"B" Witters, NE SW NE 7-14n-48w. Dry. TD 4,680 ft.

Kimball County: Superior Oil Co. 66-8 Roberts, SE NW SE 8-13n-54w. Dry. TD 6,164 ft.

NORTH DAKOTA

Bottineau County: National Associated Petroleum Co. 1 Newhouse, C NE SE 3-162n-69w. Temporarily abandoned. TD 3,594 ft.

* Zack Brooks-Crawford Smith 1 Berentson, C SW SE 21-163n-80w. IPP pumping 2 days per week averaging 28 to 32 bbl. of oil per day. Charles 3,337 ft. TD 3,633 ft.

McKenzie County: Amerada Petroleum Corp. and Pacific Wester 1 Wollan, C NW NW 15-152n-96w. IPF 36 BOPD, ½-in., Madison discovery, Silurian 12,258 ft. TD 12,379 ft. PB 9,120 ft.

CALIFORNIA

Fresno County: Ohio Oil Co. 1 J. B. Sutherland USL, 15-30s-21e. Dry. TD 5,130 ft.

WILDCAT COMPLETIONS

Intex Oil Co. 38-28 Lerdo Land, 28-28s-27e. Dry. TD 2,900 ft.

General Pet. Corp. 1-18 J. D. Martin, 18-25s-20e. Dry. TD 3,550 ft.

Superior Oil Co. 32-29 Theta, 29-28s-20e. Dry. TD 2,252 ft.

North Star Mining & Dev. Co. 2 "Well," 24-11n-18w. Dry. TD 374 ft.

Standard Oil Co. 54 Stafford-Bell. 3-30s-21e. Dry. TD 7,981 ft.

Kings County: Franco Western Oil Corp. 42 Norris Orchard, 33-24s-18e. Dry. TD 3,347 ft. McDonald 663 ft., Temblor 758 ft., Point of Rocks 914 ft.

Los Angeles County: General Exploration Co. 2 N.L.&F., 28-4n-16w. Dry. TD 11,503 ft.

Orange County: C. C. Peterson 1 Watkins-Peterson, 11--6s-11w. Dry. TD 3,270 ft.

San Benito County: Monroe-Baer Oil Co. 2 "Well," 8-17s-11e. Dry. TD 710 ft.

Oceanic Oil Co. 21.5 De Alvarez, 5-19s-10e. Dry. TD 3,174 ft.

Artnell Company 1 Onesta Rey, 19-15s-10e. Dry. TD 1,846 ft.

San Luis Obispo County: C. A. Pearson & R. M. Steffin 81-9 "Well," 9-11n-28w. Dry. TD 2,696 ft.

Sutter County: Richfield Oil Corp. 2 Butte Comm., 3-15n-1e. Dry. TD 7,768 ft.

Ventura County: Los Nietos Co. 1 Barnard, 23-3n-21w. Dry. TD 7,031 ft.

MONTANA

Big Horn County: Carter Oil Co. 1 Crow Tribal, C NE SE 27-1s-54e. Dry. TD 5,464 ft. Cambrian 5,448 ft.

McCone County: Shell Oil Co. 14-5 NPRR, C SW SW 5-22n-48e. Dry. TD 9,648 ft. Ordovician 9,381 ft.

Prairie County: California-Canadian-Gateway 1 Cedar Creek Government, NE NE SW 24-12n-56e. Dry. TD 9,473 ft. Red River 9,408 ft.

Teton County: Northern Drilling & Producing Co. 1 Hemstead, SW SW SE 20-26n-2e. Dry. TD 1,753 ft. Madison 1,749 ft.

UTAH

Carbon County: Three States 1 Wasatch Land & Cattle, C NW NE 22-12s-7e. Dry. TD 7,917 ft. Morrison 6,899 ft.

Emery County: Cities Service 1 Government, C NE NW 1-16s-12e. Dry. TD 7,930 ft. Mississippian 6,362 ft.

Uintah County: Signal-Uintah Oil 2 Government-Buesche, NE NE NW 1-6s-23e. Dry. TD 2,336 ft.

COLORADO

* Adams County: Forest Oil Corp. 1 C. D. Causey, NE SW NW 23-2s-57w. IPP 213 BOPD, 2-in. tubing, "D" sand discovery, new field, "J" sand 5,300 ft. TD 5,428 ft.

Adams County: William R. Whittaker Co. 1 Beltz, C NE SW 8-1s-62w. Dry. TD 7,370 ft. "J" sand 7,255 ft.

Morgan County: Sunbeam Oil (Eddie Fisher) and Reco Oil Co. and Denver Basin 1 Stenbeck, NW NE SW 26-1n-55w. Dry. TD 5,073 ft. Skull Creek 5,070 ft.

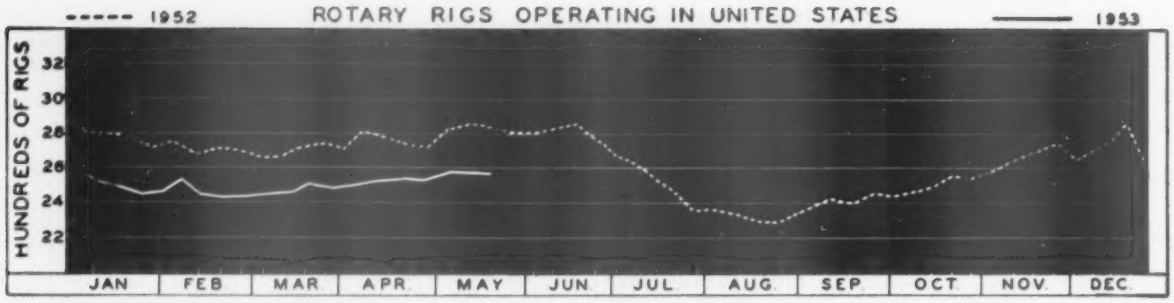
Goodall-Calstar 1 Queen, SE NE NE 25-1n-56w. Dry. TD 5,130 ft.

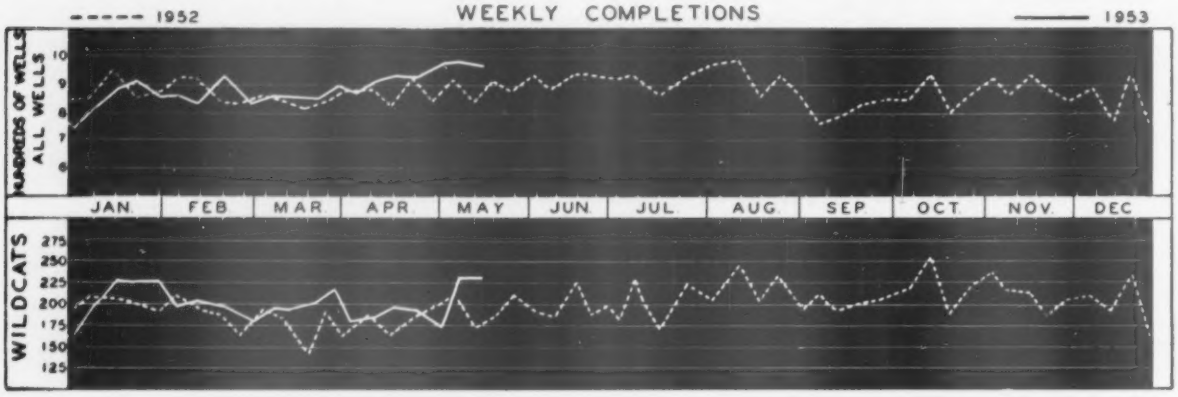
Prowers County: Lotus Oil Co. 1 Fee, SE NW NW 14-23s-56w. Dry. TD 5,190 ft. Chatanooga 4,975 ft.

Washington County: Woodward Oil, Inc. and Ziegler Exploration Co. 1 Blake, NE NE SE 8-2s-55w. Dry. TD 5,260 ft. Lakota 5,238 ft.

Weld County: Eisenhower Drilling Co. 1 Niles, C SW SE 13-6n-61w. Dry. TD 8,171 ft. Lyons 7,925 ft.

(Continued on page 316)





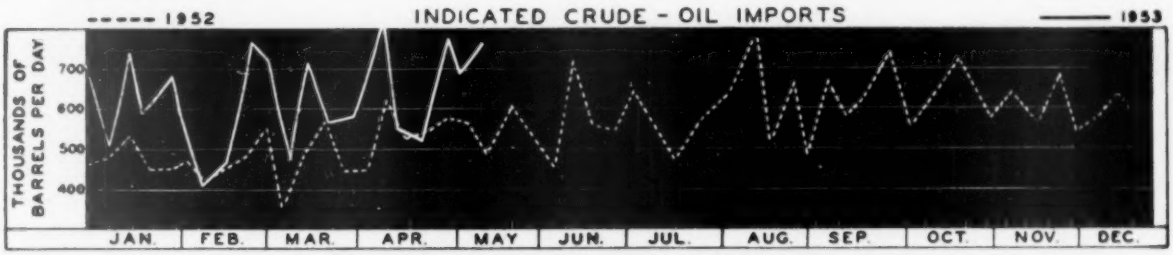
CURRENT STATISTICS

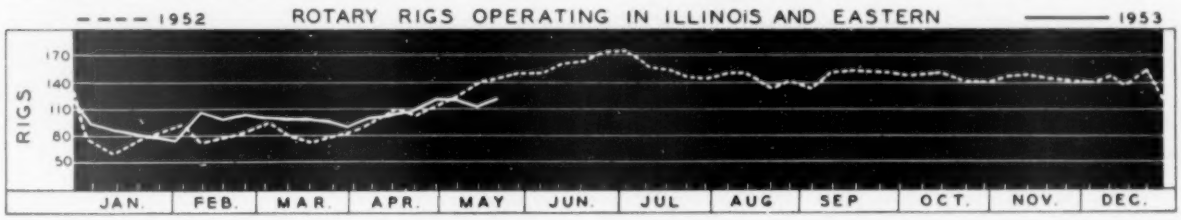
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED MAY 16, 1953

	Total of all wells					May 16		Wildcat completions and discoveries					Cumulative total, 1953				
	Comp.	Oil	Gas	Dry	Footage	1953	1952	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	14	7	0	*7	20,100	253	279	0	0	0	0	0	0	0	0	0	0
Pennsylvania	34	17	4	†13	63,600	625	638	0	0	0	0	0	0	0	3	7	10
West Virginia	14	0	12	2	51,096	219	229	0	0	1	0	1	0	0	4	2	6
Ohio	17	10	2	‡5	37,767	362	361	0	0	0	0	0	1	0	1	9	11
Indiana	17	8	0	9	28,816	438	411	0	0	0	2	2	7	0	1	99	107
Kentucky	26	9	5	12	49,502	392	473	1	0	0	7	8	5	0	0	71	76
Illinois	33	12	0	21	75,066	624	571	1	0	0	9	10	2	0	0	124	126
Michigan	10	5	0	5	30,190	199	243	0	0	0	2	2	7	0	3	76	86
Kansas	87	38	6	‡43	300,063	1,819	1,762	1	0	0	20	21	37	0	16	292	345
Nebraska	11	4	1	6	57,361	106	89	0	0	0	4	4	7	0	0	46	53
Oklahoma	159	95	15	§49	547,847	2,579	2,224	8	0	1	13	22	45	4	10	234	293
Texas	347	178	19	150	1,589,136	6,340	6,884	12	0	6	95	113	316	24	79	1,541	1,960
North Central (Dist. 7-B & 9)	135	74	0	61	459,167	2,314	2,140	5	0	0	34	39	163	0	8	641	812
West (Dist. 7-C & 8)	57	41	0	16	275,521	1,356	2,127	1	0	0	11	12	57	2	5	231	295
Panhandle (Dist. 10)	10	2	6	2	36,716	320	270	0	0	0	1	1	0	2	0	10	12
Eastern (Dist. 5 & 6)	13	5	0	8	61,323	306	339	0	0	0	5	5	8	2	3	99	112
Gulf Coast (Dist. 2 & 3)	72	32	5	35	487,247	966	1,039	4	0	1	22	27	47	5	34	247	333
Southwest (Dist. 1 & 4)	60	24	8	28	269,162	1,078	969	2	0	5	22	29	41	13	29	313	396
Louisiana	45	23	3	19	319,365	939	841	0	0	0	7	7	20	6	9	124	159
Northern	16	8	3	5	45,940	367	441	0	0	0	0	0	1	0	2	42	45
Southern	29	15	0	14	273,425	572	400	0	0	0	7	7	19	6	7	82	114
Arkansas	11	8	0	3	29,943	167	144	0	0	0	0	0	5	0	0	33	38
Mississippi	7	2	0	5	43,459	127	147	0	0	0	4	4	6	0	3	65	74
Southeastern States	2	0	0	2	10,638	51	21	0	0	0	2	2'	1	0	0	36	37
Montana	4	1	0	3	28,222	132	74	0	0	0	3	3	1	0	0	36	37
Wyoming	15	12	0	3	73,862	215	220	0	0	0	0	0	5	0	0	34	39
Colorado	12	5	1	6	62,461	179	149	1	0	0	6	7	6	0	5	91	102
Utah	3	0	0	3	18,183	28	27	0	0	0	3	3	1	0	0	18	19
New Mexico	36	6	29	1	184,011	476	356	0	0	1	0	1	8	0	5	47	60
California	51	32	0	19	241,330	944	965	0	0	0	16	16	23	0	3	217	243
North Dakota	10	8	0	2	81,793	92	12	2	0	0	1	3	2	0	0	18	20
Miscellaneous (Tenn.)	4	2	0	2	5,102	18	29	1	0	0	2	3	1	0	0	14	15
Total United States	969	482	97	390	3,948,913	17,324	17,149	27	0	9	196	232	506	34	142	3,234	3,916
Total previous week	981	503	71	407	3,879,262			23	2	14	193	232	479	34	133	3,038	3,684
Total May 17, 1952	908	481	74	353	3,754,086			30	3	5	143	181	544	39	98	2,973	3,654

Service wells included: *7, †12, ‡1, §5.

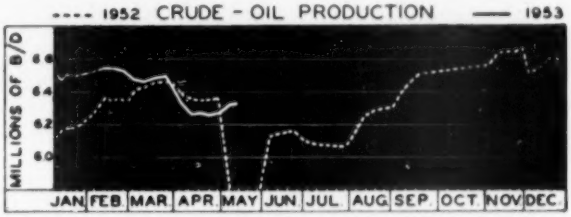


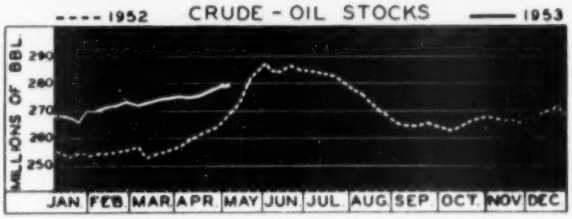


DAILY AVERAGE PRODUCTION FOR WEEK

	May 16			May 9
	Crude oil	Lease condensate	Total	total
Alabama	4,800		4,800	4,900
Arkansas	76,500	600	77,100	77,400
California	999,500		999,500	999,500
Colorado	92,600		92,600	94,700
Eastern	57,900		57,900	57,800
Florida	1,500		1,500	1,500
Illinois	158,800		158,800	161,200
Indiana	35,500		35,500	35,200
Kansas	329,300		329,300	321,500
Kentucky	29,900		29,900	29,900
Louisiana	660,925	41,000	701,925	702,325
North	110,600	2,500	113,100	113,500
South	550,325	38,500	588,825	588,825
Michigan	34,100		34,100	34,200
Mississippi	93,500	4,850	98,350	97,750
Montana	30,000		30,000	31,400
Nebraska	13,600		13,600	13,500
New Mexico	189,325	700	190,025	189,825
Oklahoma	532,600		532,600	530,200
Texas	2,671,575	45,475	2,717,050	2,717,050
Dist. 1	35,075	350	35,425	35,425
Dist. 2	146,500	6,325	152,825	152,825
Dist. 3	438,625	23,000	461,625	461,625
Dist. 4	248,725	5,200	253,925	253,925
Dist. 5	46,700	400	47,100	47,100
Dist. 6	119,950	5,700	125,650	125,650
East Texas field	247,000		247,000	247,000
Dist. 7-B	108,000	75	108,075	108,075
Dist. 7-C	151,800	3,500	155,300	155,300
Dist. 8	888,250	200	888,450	888,450
Dist. 9	168,250	700	168,950	168,950
Dist. 10	72,700	25	72,725	72,725
Utah	5,000		5,000	5,300
Wyoming	207,200		207,200	209,100
North Dakota	14,000		14,000	14,600
Total U. S.	6,238,125	92,625	6,330,750	6,328,850
Change from previous week, up			1,900	
Canada	208,908		208,908	195,000
Total U. S. production January 1-May 16				874,657,425 bbl.
Same period last year (crude plus cond.)				*849,984,800 bbl.

*Includes 12,712,735 bbl. condensate.



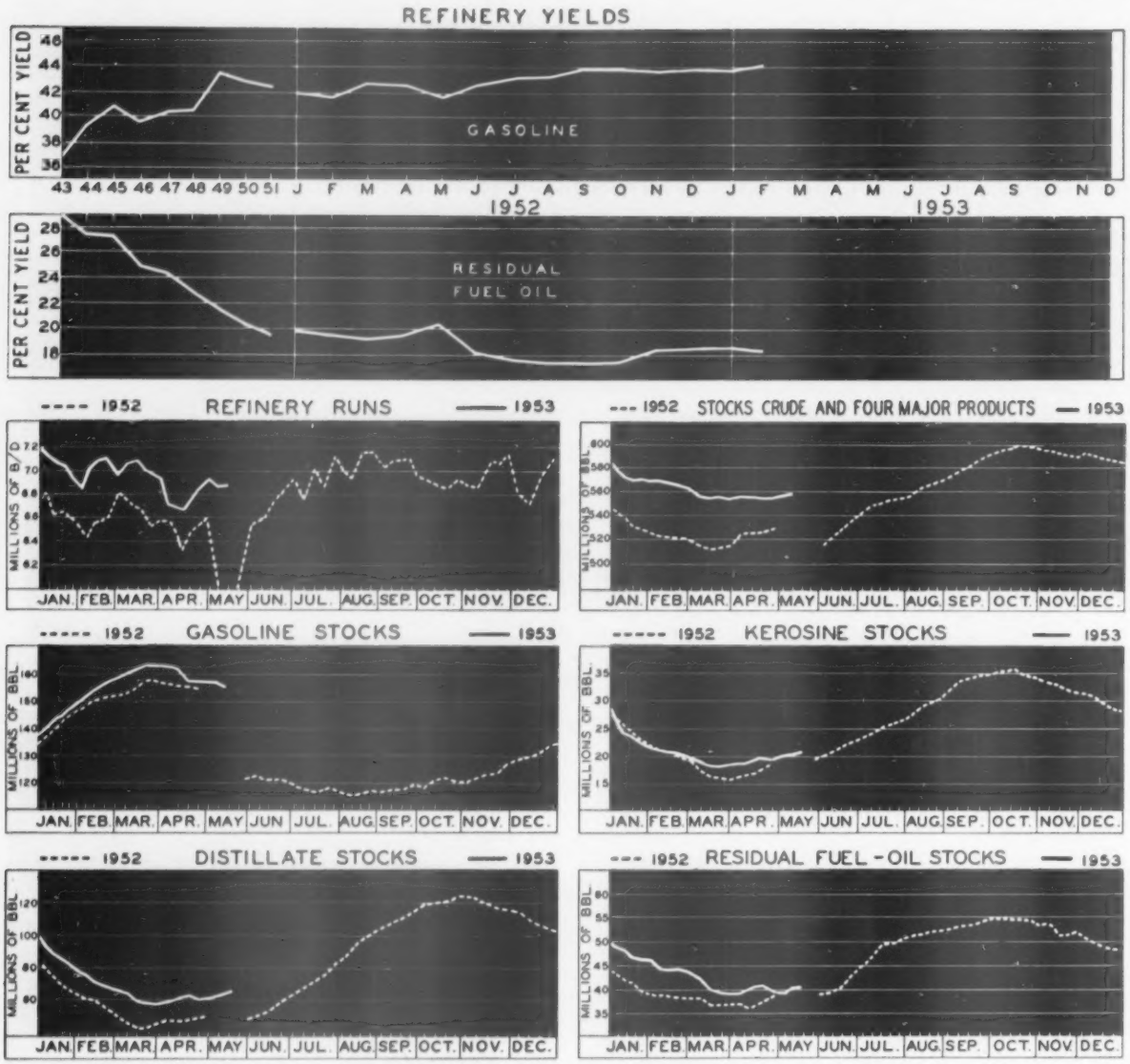


CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	May 9, '53	May 2, '53	May 10, '52
Pennsylvania Grade	2,550	2,527	2,461
Other Appalachian	2,206	1,961	1,999
Illinois, Indiana, Michigan	11,891	11,601	12,566
Arkansas	2,914	3,036	3,223
Louisiana	16,037	15,839	15,114
North	2,958	2,687	2,924
Gulf	13,079	13,152	12,190
Mississippi	4,192	4,055	3,599
New Mexico	7,385	7,469	7,414
Oklahoma and Kansas	38,437	38,784	42,858
Texas	134,562	136,537	134,117
East Texas proper	11,185	11,772	12,774
West Texas	63,467	64,068	59,481
Texas Gulf	25,870	26,396	29,863
Other Texas	34,040	34,301	31,999
Rocky Mountain	16,317	16,381	15,726
California	32,349	33,255	30,199
Foreign	9,345	8,124	7,621
Total	278,185	279,569	276,897

*Bureau of Mines.

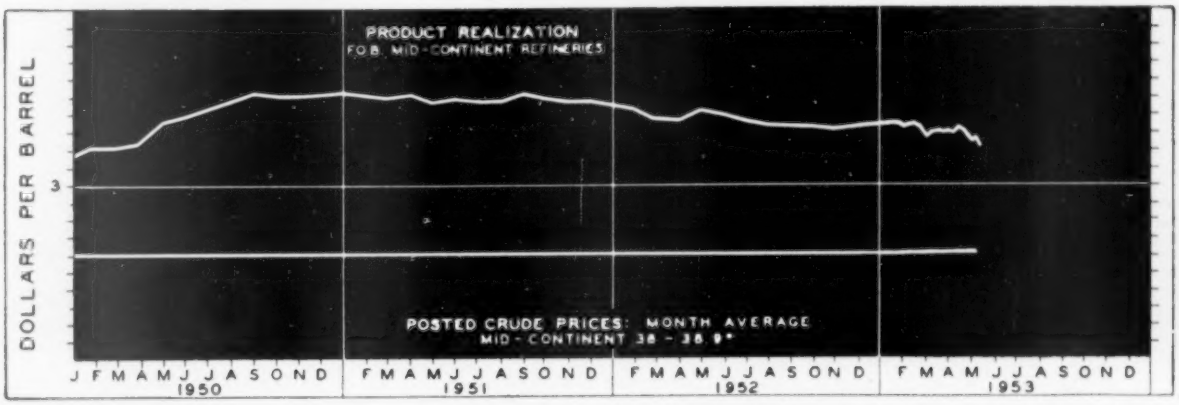

REFINERY YIELDS
PER CENT YIELD
GASOLINE
RESIDUAL FUEL OIL
43 44 45 46 47 48 49 50 51 J F M A M J J A S O N D J F M A M J J A S O N D
1952
1953
REFINERY RUNS
MILLIONS OF B/D
STOCKS CRUDE AND FOUR MAJOR PRODUCTS
MILLIONS OF BBL
GASOLINE STOCKS
KEROSINE STOCKS
DISTILLATE STOCKS
RESIDUAL FUEL-OIL STOCKS
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

A.P.I. REFINERY REPORT, MAY 16

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, May 1952 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	977	411.0	45.0	205.7	225.3	35,082	9,145	20,524	10,055	1,005	411.0	43.0	219.7	203.7
Appalachian:														
District 1	112	42.0	5.6	17.6	15.9	3,733	400	850	360	102	43.9	3.3	16.3	13.3
District 2	100	48.6	3.9	13.0	13.7	1,755	262	402	101	43	22.9	2.0	7.3	8.6
Ind., Ill., Ky.	1,234	606.7	83.7	186.1	175.3	32,555	3,689	8,952	3,247	741	378.1	37.3	127.4	105.0
Okla., Kans., Mo.	581	324.6	9.0	140.0	58.0	17,386	1,382	6,879	1,227	373	205.9	9.5	82.7	37.7
Inland Texas	267	175.0	22.8	32.3	34.6	6,536	401	1,293	1,018	269	187.8	12.4	41.6	42.2
Texas Gulf Coast	1,651	794.6	134.0	379.0	237.8	21,068	3,127	9,446	6,171	629	270.1	55.0	184.7	77.3
La. Gulf Coast	545	264.6	42.6	139.1	51.8	7,387	1,840	4,094	1,445	507	236.8	51.6	110.9	59.1
N. La. and Ark.	87	33.8	9.3	16.9	6.7	3,366	447	994	104	66	22.7	3.6	14.9	7.7
Rocky Mountain:														
New Mexico	19	12.3		2.7	3.7	152		32	30	17	10.1	.5	3.1	4.3
Other Rocky Mtn.	233	111.7	8.7	49.9	39.9	6,688	300	1,702	886	189	79.9	4.0	41.1	36.0
California	1,078	455.1	9.0	138.3	375.3	19,707	367	9,773	15,614	964	426.0	6.3	132.0	383.7
May 16, 1953	6,884	3,280.0	373.6	1,320.6	1,238.0	155,415	21,360	64,941	40,258	4,905	2,295.2	228.5	981.7	978.6
May 9, 1953	6,865	3,291.6	339.0	1,352.1	1,253.1	157,337	20,221	62,964	40,070					
May 17, 1952		(Data incomplete for 1952 strike period)												

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952
F M A M J J A S O N D
1953

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.20 for week ended May 9, $3.26 for previous week, and $3.41 for May 1952. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of May 20, 1953. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10¼-10½	12-12.75	10½-11
Premium gasoline	11¼-11½	13.125-14	11¾-12
42-44 w.w. kerosine	8⅜-8¾	10.15-10.65	9
No. 2 straw fuel oil	7⅜-7¾	9.15-9.65	8
No. 6 residual	$0.90-1.00	$2.10-2.25	$1.60-1.70

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5½	5	5¼
Grade 18-55	6.60	6.10	6.35

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	12-13
750 vis., No. 3-4 neutral	15-16
2,000 No. 5-6 neutral	17-18

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	20.5-22
200 vis., No. 3 neutral, 0-10 pp.	12-13

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	26.5
180 vis., 10 p.t. neutral	28.5

WAX

Mid-Continent

132-134 A.M.P.	5.5

PRIMARY market news has been highlighted by the contraseasonal strengthening of the heavy-fuel market for inland areas following the firming on the East Coast.

Most residual in the Group 3 area is moving at about $.90 a barrel which is the price the railroads are paying for heavy fuel in May. Even up to a week ago, a reportable percentage of the spot material was traded at $.85.

The reason for the stronger residual market is reduced production rather than greater industrial demand. Heavy-fuel production in the combined districts of Oklahoma - Kansas - Missouri and Illinois-Indiana-Kentucky has decreased steadily since the first of the year. Stocks in these two districts amounted to 6,640,000 bbl. for the week ended January 3 of this year. For the week ended May 9, stocks were down to 4,367,000 bbl., a reduction of 119,600 bbl. per week or 34 per cent. These are not unusual weeks since residual stocks for these districts decreased in all but one of the weeks in the period between the above dates. In the week, with the increase, the gain was only 15,000 bbl.

Demand for residual fuel normally decreases in the spring and summer months, but this year, production decreases have been greater than reductions in demand, resulting in a firmer market for the product. Extreme reductions in consumption have been prevented by contracts between primary suppliers and utility companies, particularly in Kansas, guaranteeing delivery of heavy fuel at prices competitive with coal. Also, many refiners will use residual as refinery fuel unless the price goes above the break-even point between natural gas and residual.

Residual fuel is still firm on the East Coast at a low of $2.10 a barrel, and very little spot material is reported available on the Gulf Coast at $1.60. Spot rates for dirty tankers were off slightly in the second full week of May.

CRUDE PRICES GRAVITY SCHEDULE

	Signal Hill, Calif‡	Okla. homa, Kansas	Gulf Coast Tex.*	West Tex.†
14-14.9	$1.87	....	....	....
15-15.9	1.93	....	....	....
16-16.9	1.99	....	....	....
17-17.9	2.05	....	....	....
18-18.9	2.11	....	....	....
19-19.9	2.18	....	....	....
20-20.9	2.24	$2.25	....	$2.12
21-21.9	2.30	2.27	....	2.14
22-22.9	2.37	2.29	....	2.16
23-23.9	2.45	2.31	....	2.18
24-24.9	2.53	2.33	$2.56	2.20
25-25.9	2.61	2.35	2.58	2.22
26-26.9	2.69	2.37	2.60	2.24
27-27.9	2.76	2.39	2.62	2.26
28-28.9	2.83	2.41	2.64	2.28
29-29.9	2.91	2.43	2.66	2.30
30-30.9	2.97	2.45	2.68	2.32
31-31.9	3.04	2.47	2.70	2.34
32-32.9	3.12	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico.

Last general price change represented a 50-cent increase, effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Beauregard Parish	$2.60
Cotton Valley (distillate)	2.85
Cotton Valley (crude)	2.70
Texas:	
East Texas	2.65
Pecos County (Yates)	2.35
Conroe	2.83
Van	2.48
Pennsylvania Grade:	
Bradford	4.40
Southwest Pennsylvania	3.97
West Virginia	3.91
Illinois Basin	2.77

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FOR SALE: Type 80 Cooper Twin Compressors, 175 KVA Generating Plant, water pumps, and water tanks. Alfred B. Kern, 223 Wright Building, Tulsa, Oklahoma.

FOR SALE: Model R.L. 3-Drum Cardwell Spudder, Trailer Mounted, complete with all tailing-in tools. 7000 feet almost new 9/16-inch and ¾-inch lines. Will sell with or without tools. For full description and inventory, write Box G-406, The Oil and Gas Journal, Tulsa, Oklahoma.

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DISMANTLING GASOLINE PLANT AT BENAVIDES, TEXAS

FOR SALE: 4—Clarke engines, horizontal 2 stage, 90 H.P. 3—Cooper-Bessemer Type 10 engines 2 stage, 115 H. P. 2—Electric Generators. 7—Heat Exchangers.

T. W. GODFREY
Phone 545, Refugio, Texas, or Box 134, Woodsboro, Texas

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N-4 BREWSTER rotary drilling rig, 12" Gardner-Denver pump w/ NKU Waukesha engine, Lee C. Moore mast, 5½" Substructure, 5800' of 3½" Ext. upset int. flush drill pipe. All purchased new. Has been in use 12 mos. A-1 condition. Write Box 4657, Oklahoma City, or Pho. ME 4-1413.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

FOR SALE: Casing 670' of 10" ID 32 lb. 1000' of 7" OD 20 lb., 500' of 8" ID 24 lb., 1600' of 2" tubing and rods. All A-1 used casing. Boyer Oil Company, Box 35, Iola, Kansas. Phone Residence 320, Office 949.

STANDARD rig—all size tools 6¼" to 13". Lots of extras. Everything you need to drill a well. Excellent condition. $5000.00. Located near Marietta, Ohio. M. N. Judson, Rural Valley, Pa. 3-311.

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722 Oliver St. N.W. Atlanta, Ga.

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WE OFFER: Two casing pulling units—Hydraulic operated—in A-1 condition—together with two pickup trucks 1950 and 1952 models and two heavy metal tool houses and one circulating unit. Pipe Pulling, Inc., Stafford, Kansas.

FOR SALE

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10,000' 4¾" O.D. used seamless steel tubing, ⅜" wall, approx. 28' lengths, plain end, located near Chicago.

We carry large quantities of used seamless steel boiler tubing from 1⅞" O.D. to 5½" O.D. suitable for high pressure oil, gas and water lines, all straightened, cleaned inside and out, shows practically no pitting, all tested for 1000# hydrostatic pressure at our plant before shipment.

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Phone: PArkview 6885

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FOR SALE: 80,000′ 4½ O.D. S.S. line, 60,000′ 3½ O.D. line, 60,000′ 6⅝ S.S. line. Lundquist Pipe & Supply Co., Phone 5-8850, Tulsa, P.O. Box 1215.

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Power pumps, drilling engines, rotary tables, pipe, tubing and tanks. Hoffman Pipe & Supply, Box 1368, Longview, Texas.

DIESEL Generating Unit. 746 Hrs. operating time—37½ KVA, 3 Phase, 60 Cy. 220/40 V. 1800 RPM, Century Gener. connected to 72 HP Model 6DTG317 B/M #D3076 Buda Diesel. Price $3,000. Red Head Oil Co., Brilliant, Ohio.

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AT-3427—Houston, Texas

FOR SALE

2200′ NEW 14" OD x .375" Wall Grade B A-53 National Seamless Pipe P.E. DRL located Mid-Continent Area Mill Carload Price Plus Freight. Subject inspection.

FRANK MORRIS AND COMPANY
424 South Cheyenne St., Tulsa, Oklahoma
Telephone 2-6247

FOR SALE
DIESELS AND PUMPS

Two new 1947 unused 475 BHP 5 cylinder Baldwin Model VG Diesel Engines, each connected to Worthington Horizontal Triplex Double Acting Pump, both units with Falk Couplings and other accessories. Location Ohio, immediate delivery. Direct inquiries to

THE BUCKEYE PIPE LINE CO.
Joseph Steele, Purchasing Agent
Room 2200, 30 Broad St.
New York 4, N. Y.

* FOR SALE *
IMMEDIATE DELIVERY
NEW DIESEL STEEL VESSELS

TUGS—45′ 200 H.P. and 275 H.P.—55′ 400 H.P.; Twin-screw 550 H.P., WATER TAXIS (Crew Boat) Twin-screw 400 H.P. 27 m.p.h.

WE ALSO BUILD TO ORDER
—Inspection Invited—
EQUITABLE EQUIPMENT CO., INC.
410 Camp St., New Orleans 12, La.
RA-9744

FOR SALE

Complete National 100 Rig including 3 PTD-6 Superior Diesel Engines with dual fuel equipment, 136′ Lee C. Moore Mast with 8′ substructure, 2 C-350 Ideal Power Pumps, Ideal Type 548 TC Traveling Block, Type R3 Swivel, and Type MS-20½ Rotary Table. Excellent condition, priced reasonable, located in Montana. Complete inventory upon request.

Box G-341

The Oil and Gas Journal,
Tulsa, Oklahoma

EQUIPMENT FOR SALE

FOR SALE: Lee C. Moore Cantilever Mast, 415,000# capacity, 9′ steel substructure; Wilson Giant Double Drum Drawworks, powered by two WAK Waukesha; two pumps, 12" Emsco and 10" Dean Bros.; 17½" Rotary; National 120 ton Block; 60 ton B. J. Hook. Write Box 3246, Corpus Christi, Texas.

FOR SALE: Super "J" Fort Worth Spudder—complete with tools 15½ thru 6 inch. R6I Climax power, Kohler AC light plant. Big pipe if desired. Don L. Choate, Box 310, Cisco, Texas.

TWO light shot hole drills. Hydraulic rigs mounted on used Ford trucks. Just came out of the field. Price $3500.000 each, with used water truck included. Located at 3820 N. W. 39th Street in Oklahoma City. Phone Windsor 2-4226. Young Exploration Company.

FOR SALE or rent 3½" OD Internal Flush, External Upset, Modified drill pipe. Chapman Pipe & Supply ME-81567, Box 4232, Okla. City, Okla.

LEATHER DIAPHRAGMS for sale. 150 No. 2 Toby, 250 No. 3 Toby, 100 No. 1 Iron Clad. Price one-half of list. Geo. R. Milner, Okmulgee, Oklahoma.

FOR SALE: LOCKHEED PV-1 unconverted Airplane. Cruise 260 to 270 mph., range 1500 miles, 600 total hours since new. Will stand rigid inspection. Bomb Bay tanks and dual control kit furnished with this offer. Low dollar offer $46,500. For executive Aircraft, Lockheed, Douglas, and Beechcraft, write or wire Sasco, P. O. Box 2672, Telephone 4-4549, Tulsa, Oklahoma.

5,000 NEW 2⅜" O.D. standard merchant couplings galvanized, and black. Special price $10.00 per hundred; will sell any part. Also 8,000 8⅝" O.D. line pipe 8-V thread couplings priced $1.50 each, also 2500 10¾" O.D. off of 40½ lb. line pipe as well as 3500 12¾" O.D. 8-V thread. A. A. Gilbert Pipe & Supply Co., Shreveport, La.

FOR SALE: Heavy duty 45 Star spudder, seamless pipe mast. Allis-Chalmers L 90. Engine on skids. Drilling tools from 6" to 12½. In A-1 condition. Inventory and price on request. Harry Leamon, McLouth, Kansas.

OIL COMPANY for sale; income approx. $20,000.00 per mo. Also Denver-Julesburg basin drilling deals. Box 115 or Phone 345, Brush, Colorado.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

EQUIPMENT WANTED

WANTED TO BUY: Good used 80 or 100 horse steamer for mounting on float or truck. Box G-466, The Oil and Gas Journal, Tulsa, Oklahoma.

NOTICE: We buy, We sell equipment everywhere. If you want to sell or buy, contact Pressey & Son, Pueblo, Colorado.

WE BUY SURPLUS VALVES and FITTINGS

We want your surplus valves, flanges and fittings. Write or call.

Newman's Inc.
700 So. Maybelle Tulsa, Okla.
LD 635 Phone 2-5228

EQUIPMENT WANTED

WANTED in Oklahoma: 2400′ of 7", N-80 26#, LT&C; 3200′ of 7", N-80, 23#, LT&C. Will trade 7", 20# or 23#, J-55, Deep Rock Oil Corporation. Joe A. Huitt, Tulsa, Oklahoma.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale? Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

WANTED—Bolted type steel tanks, new, and if used must be A.P.I. late type having a capacity of 500 bbl. and larger. Also high pressure welded steel tanks 10,000 gal. and larger for propane.

A. GREENSPON PIPE CO., INC., 30 South Bemiston Avenue, St. Louis 5, Missouri. Phone: PArkview 6885.

HELP WANTED

INDEPENDENT OIL COMPANY desires geologist on part-time basis. Should be experienced in mapping and checking desirable areas for lease plays and drilling. Give full details on educational and experience backgrounds and remuneration desired. All replies confidential. The Oil and Gas Journal, Box G-483, Tulsa, Oklahoma.

OIL Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974 Tom Robinson, owner. For Technical and Trained Personnel, including LPG.

ENGINEERS WANTED

Anderson - Prichard Oil Corporation, Oklahoma City, Oklahoma, has Production Department openings for several engineers with degrees in petroleum or mechanical engineering. Excellent opportunity for young man interested in oil producing and drilling operations or reservoir and evaluation work. A year's experience is desirable, but college education and willingness to assume responsibility are essential prerequisites. Initial location will be Oklahoma City. Applicants should write giving age, brief review of education and experience, and salary expected. Please address

ANDERSON-PRICHARD OIL CORPORATION
Liberty National Bank Building, Oklahoma City, Oklahoma, for the attention of Mr. D. F. Tver, Industrial Relations Department.

GEOLOGIST
SOUTH AMERICA

Major oil company affiliated with Standard Oil Company (N. J.) has attractive staff position available for experienced surface geologist. Must be qualified to assume professional and administrative duties of party chief for field party.

Write giving age, marital status, education, and details of experience.

Box 308-G
Radio City Station
New York 19, N. Y.

HELP WANTED

WANTED IMMEDIATELY—Man experienced in PVT analysis and interpretation to take charge of PVT Department in a commercial laboratory operating in the Rocky Mountains. Salary open. Write P.O. Box 279, Casper, Wyoming, or Telephone 3-5741.

SALES REPRESENTATIVE: Age 28 to 40 mechanical background contact oil industry Rocky Mountain oilfield territory. Headquarter in Casper, Wyoming. Excellent future in one of the oldest firms in their field. Car, expenses, plus salary commensurate with background and ability. Applicants must furnish complete background of employment, education, also other qualifications in initial letter. Replies treated confidential. Box G-481, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED
PETROLEUM
ENGINEER

to supervise multiple operations. Thoroughly experienced in the operation of medium-sized refineries and absorption plants and familiar with newest technical advancements. State full details, including past experience, references and compensation desired.

Box G-502
The Oil and Gas Journal
Tulsa, Oklahoma

EQUIPMENT
INSPECTION
ENGINEERS
SOUTH AMERICA

A major oil company affiliated with Standard Oil Company (N. J.) needs graduate engineers with several years refinery process equipment inspection experience. Must be qualified to interpret codes and specifications, predict equipment renewals, and recommend replacement equipment.
Write giving age, marital status, education, and full details of experience.

Box 308-H
Radio City Station
New York 19, N. Y.

WANTED
CHIEF GEOLOGIST
for
Aggressive Independent Oil Company

Operating in Rocky Mountain Area, Mid-Continent, North and West Texas.
Experience in these areas desirable. Give complete details of education and experience by letter in duplicate. All replies held confidential.

Box G-460
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

HELP WANTED

CHEMICAL Engineer. Not over two years industrial experience. Technical and Administrative Assistant in modern mid-south petroleum refinery. State experience, education and salary requirements. Box G-498, The Oil and Gas Journal, Tulsa, Oklahoma.

MUD MAN
We are looking for a man who has actual experience in the field with drilling mud. Experience should be either on the rig, with a mud supply house, or a mud service company. We need an area supervisor who is interested in greater earnings with an established and growing manufacturer. Our organization knows of this ad. Write Box G-474, The Oil and Gas Journal, Tulsa, Oklahoma.

TERMINALS ENGINEER & Supervisor: To supervise construction and maintenance of petroleum products terminals. Age to 40. Experience such work necessary. Engineering degree desirable but not required. Locate in Southeast. Some travel required. Salary open. In applying give complete details as to personal, educational and experience background, and salary expected. Box G-475, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES MANAGER WANTED
Southwestern extruder of polyethylene, tenite and rigid vinyl pipe is looking for an experienced sales manager. Applicant must be free to travel almost entirely, and should have either some knowledge of plastics or a good knowledge of sales as it pertains to gas and oil industry. Salary open. State full details as to age, experience and salary expected. Box G-510, The Oil and Gas Journal, Tulsa, Oklahoma.

LAND MAN
Large company which is well known in Southern states has recently opened a district Geological, Exploration and Production office in New Orleans and needs for that office a land man familiar with South Louisiana. Such man should also have familiarity with Southern Mississippi. Prefer a man under 42 years of age and one familiar with farm-out negotiations, operating contracts, lease acquisitions and lease record procedure and titles. Company is entering South Louisiana on a conservative basis. In replying state age, experience in detail, education, and references, enclosing recent photograph. So as not to jeopardize your present position your application will be held in confidence. Box G-453, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEERS
FOREIGN SERVICE

Graduate engineers with good background in general physics, mathematics, mechanics and with some laboratory experience in equipment and techniques. For laboratory position responsible for theoretical experimental studies on reservoir fluid and rocks. Duties will consist of designing equipment, performing or supervising testing and analyzing and reporting results. Studies pertinent to evaluation of primary depletion practices and applicability of secondary recovery for pressure maintenance operation will be required.

Please write giving full particulars regarding personal history and work experience. Please include telephone number.

RECRUITING SUPERVISOR
BOX OG-5
Arabian-American Oil Company
505 Park Avenue
New York 22, N. Y.

HELP WANTED

CHEMICAL Engineer for work in natural gas and gasoline field with independent in West Texas. Gasoline plant experience desirable, but not required. Include education, complete brief of experience, and salary expected, in first reply. Box G-492, The Oil and Gas Journal, Tulsa, Oklahoma.

SOUTH AMERICA. These jobs are with one of the better oil companies. Our fee paid. Mechanical Engineer — graduate, no experience required. Petroleum Engineer—graduate, no experience required. Chemical Engineer—graduate, no experience required. Mud Technician—two or more years' experience, single. Accountant—college graduate, Accounting major, single. All information confidential and should be mailed to CHAS. J. LOVELESS PERSONNEL SERVICE, 616 S. Main, Tulsa, Oklahoma. Phone 3-5168.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

ELECTRIC LOGGING man with all around experience, including interpretation, operation and maintenance. Good salary and opportunity to acquire interest in aggressive electric well surveying company with good future. Address Box G-497, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Experienced Safety Engineer, for oilwell drilling contractor, with nine (9) rotary rigs operating in West Texas and Southeast New Mexico area. In applying, give age, references, and experience. Reply Box G-496, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Engineer with mechanical, Petroleum or Chemical background. Some field experience desirable. Work involves product development and manufacturing for substantial and growing Company. Opportunity for right man. Write Box 2204, Odessa, Texas. Replies confidential.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

SITUATIONS WANTED

LANDMAN, 10 years experience all types of land transactions relating to exploration. Presently employed. Business degree, Oklahoma University. Will go anywhere. Box G-499, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: 34, family, employed. 8 years major oil company experience, subsurface, surface. 4 years Rocky Mountains. Prefer position with Major or large independent in Rocky Mountains. Box G-500, The Oil and Gas Journal, Tulsa, Oklahoma.

MILLION-MILE Airline Captain—seeking position in executive flying capacity, 32 years, married, two children, 9200 flying hours. Want something with a future—now employed with large scheduled airline. Box G-501, The Oil and Gas Journal, Tulsa, Okla.

GRADUATE CIVIL ENGINEER, 29, 1½ years experience with inspection and maintenance refinery equipment. Commercial pilot's license. Desires position combining engineering and flying. Box G-503, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT - EXECUTIVE who now has own business desires employment with established company. Experience includes all phases of Oil Company Accounting including systems, procedures and mechanical methods. 20 years with major company. Box G-507, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN ASSIGNMENT wanted by graduate Civil Engineer, with ten years in tropics in charge responsible work. Experienced in design and construction of oil field installations, including buildings, roads, bridges, and airfields. Extensive survey and mapping experience, including location surveys. Skilled in inventories, with profound knowledge of materials, warehousing and handling, and transportation methods. Speak Spanish. Box 360, Voth, Texas.

SITUATIONS WANTED

M.E. AND I.E. GRADUATE seeking manufacturers to represent in Okla. area. Three years selling experience. One year equipment buyer large oil company. Own car, single, free to travel. Box G-477, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, 32, five years Rocky Mountain and two years Mid-Continent—Gulf Coast major company experience wants job with independent company Rocky Mountain Area. Box G-440, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1628, Ph. No. 3-3141, Hobbs, New Mexico.

SALES ENGINEER, age 40, twenty years experience in drilling and servicing companies, including foreign fields, wants job with aggressive organization, preferably promoting new tools. Box G-472, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: Energetic young family man desires employment with a progressive independent. Subsurface & well experience in East Texas & Gulf Coast, now employed by a major company. Box G-506, The Oil and Gas Journal, Tulsa, Oklahoma.

RECENTLY retired geologist, wide and successful experience, good health, desires part or full time engagement. Box G-495, The Oil and Gas Journal, Tulsa, Oklahoma.

CORROSION Engineer—married, seven years pipeline corrosion experience. Desires change with opportunity for advancement—preferably new transmission company or company planning Corrosion Department. Box G-494, The Oil and Gas Journal, Tulsa, Okla.

EXPERIENCED in land, well-sitting, and contact work. Desire connection with drilling or oil company, or selling in related fields. Free to travel. Box 9071, Arlington Heights Station, Fort Worth, Texas.

LANDMAN, five years land and title experience; LLB and BBA degrees; 34 years of age; references furnished. Box G-508, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: Gulf Coast experience with 2 major companies. Desires immediate employment. Would like to relocate. Box G-509, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column? Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

EASTERN independent individual interested from owners, small or large producing property with drilling locations old or new field can handle up to $20,000,000. Need full detail and competent engineers report. Confidential. Box G-469, The Oil and Gas Journal, Tulsa, Oklahoma.

CALIFORNIA LEASE BLOCKS

17000 acres N.W. of Coalinga. 1000 acres West of Newhall. For development or holding in whole or in part. Newhall block offsets production, no dry holes between.

CECIL BLINN
2911 Hermosita Dr., Glendale 8, Calif.
Ph. Citrus 3-2088

DRILLING DEAL—SHALLOW FIELDS

Have 2500 acres on three structures on well established oil trends. The Bed rocks are exposed and structures easy to identify. Depths from 250 to 1400 ft. Formation: Devonian, Silurian, and Ordovician. Six known pay horizons. Want partner take half, me to take other. Not for sale as a whole. Details and pictures of structure on request. Box G-505, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

FOR Central Kansas drilling deals see Lewis Short, Burrton, Kansas.

FOR SALE: Practically new 115 acre Oil and Gas Lease, heart of activity, Shelby County, Texas, price $5 per acre. Write C. A. Parker, Box 507, Center, Texas.

HAVE 50 acre lease one well site from production. Will farm out to individual or a group. 1/32nd override. Rig available. Will manage if you desire. O. N. Sellers, Box 606, Holdenville, Oklahoma. Phone 723.

SEE A. L. Bowles, Rollow Building, Ada, Oklahoma, for drilling deals.

FOR SALE: 26 producing wells located in Salt Flats Field, Luling, Texas. Total production approximately 3500 barrels per month can be increased by close supervision. 5 houses, supplies, and equipment. Plenty of acreage to drill additional wells. A real bargain and a good opportunity to get into the oil business. Priced to sell at $175,000.00. Contact Kenneth Blackmar, Luling, Texas. or Riddle Oil Co., 59 East Van Buren, Chicago 5, Illinois.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

HAVE six sections Federal lease, rent paid three years, North, East and South of deep test now drilling near Florence, Pinal County, Arizona. Close enough for excellent speculative opportunity. Box 842, Scottsdale, Arizona.

FOR SALE: Oil leases in Heart of Williston Basin, Mountrail County, North Dakota. E. G. Ranum, Valley City, N. D.

LOOKING FOR A LEASE? There will be column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

Producing Property Wanted

Interested in acquiring oil or gas producing property with substantial reserves. Large deal preferred. Also interested in drilling deals. Contact

Box G-463, The Oil and Gas Journal, Tulsa, Oklahoma

Canadian Oil Royalties, Leases and Production

AS SPECIALISTS TRADING IN OIL PROPERTIES, WE INVITE YOUR ENQUIRIES.

WRITE:
810a FIRST ST. WEST,
CALGARY - ALBERTA
TELEPHONE: 65711

Simsbury OIL CORPORATION LTD.

LEASE AND DRILLING BLOCKS

OIL & GAS LEASE, Sheridan County, Montana, 1097 acres, $10.00 per acre. Bonus $1.00 rental. Sec. 6-37-55. John Harrington, Outlook, Montana.

ROYALTIES

PRODUCING ROYALTY and overrides for sale. Wire-write-call for particulars. JACK EAGLE, 706 City Natl. Bldg., Okla. City, Okla. REgent 6-7027.

QUICK CASH: Producing royalties, Overrides or Production . . . no delay. Phone 72-4533, Robert L. Kinkaid . . . P.O. Box 26, Tulsa, Oklahoma.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

ROYALTIES WANTED

Producing Royalties
High Grade Only
Send Full Particulars
Address

C. C. HARMON
719 World Bldg., Tulsa, Okla.
P.O. Box 2151

REAL ESTATE

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

GEOLOGISTS

NO OIL NO PAY—Geochemical exploration—Iroco Laboratory—P. O. Box 630, Stillwater, Okla.

RANCHES

MONTANA STOCK RANCH

We offer for sale our well known Antelope Ranch property located in the Judith Basin Country in Central Montana. 11,294 acres deeded land and 2,597 acres State land under lease. Exceptionally well grassed and watered. High carrying capacity. Hay meadows in creek valley with water rights on two streams. Well improved. REA. Phone service. RFD mail route. Good roads. Possession this season. For additional information write or see the owners.

ANTELOPE RANCH COMPANY
616 Montana Building (Phone 1267)
Lewistown, Montana

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that approximately 27 acres of federal-owned land in SW¼ sec. 4, T. 30 N., R. 11 W., N.M.P.M., within the known geological structure of the San Juan field, San Juan County, New Mexico, will be offered for oil and gas leasing in one parcel to the qualified bidder of the highest cash amount per acre, at 1 p.m., E.S.T., on June 10, 1953, when bids will be opened. Under the lease, the lessee may not use the surface of the land and the privilege to drill for, mine, extract and remove the oil and gas deposits will not include the surface of the land; such privilege will have to be exercised solely by commitment of the lease to a unit or drilling agreement or by directional drilling of wells situated on adjoining lands. Details of the lease offering, how and where to submit bids, and a copy of the form or lease to be issued may be obtained upon request from the office of the Oil and Gas Supervisor, U.S. Geological Survey, Federal Building, Roswell, New Mexico, or from the Washington office of the Bureau of Land Management. Marion Clawson, Director.

BUSINESS OPPORTUNITIES

TELEVISION Company with properties, wants $250,000 for Television Film. Participating or non-participating. Excellent organization. Write: Drawer 150, North Hollywood, California.

NOTICE: If you want to put your tax money in oil business, I have the acreage on geological high in oil country. Need financial help to develop. Strictly business. High-grade oil five possible pay zones. Box G-504, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: MANUFACTURER and Distributor for the Improved Roll Boomer on a royalty basis or outright purchase. This load binder has many improvements including more take-up, more power and a safety feature. Although established, it needs more distribution. It is fully covered by patents. Nolan Sales Corporation, Tulsa, Okla.

URANIUM Claims for Sale: In the Beaverlodge Area, Uranium City, Canada. If interested, write—Mr. Joseph Nastasi, 4711 Dell Avenue, North Bergen, N. J. Telephone—UNion 6-2500.

FOR SALE BY ALASKANS

Stock in an Alaskan Corporation with leases on 66,560 acres of government leased ground, unitized in one block 90 air miles from Phillips Petroleums recently acquired property in Alaska. $1.00 per share non-assessable. Once oil is discovered the opportunity for investment is beyond the capacity of the small investor. Each certificate shall be for 100 shares or more.

BROKERS SOLICITED

ALASKA OIL AND GAS DEVELOPMENT CO.

Box 2000

(Please use air mail)

Anchorage, Alaska

ARE ORDERS HARDER TO GET?

If you need greater sales FORCE in selling the petroleum industry, let's discuss your problems.

We have efficient, hard hitting graduated petroleum "sales" engineers backed by top flight management specialists who are trained in the sale and service of specialty drilling products in the U. S. and Canada.

For an interview at your convenience please write or see us at the Tulsa Oil Show.

Box G-473

The Oil and Gas Journal

Tulsa, Oklahoma

Warren, Adams Promoted By Goodyear Tire & Rubber Co.

R. B. WARREN

R. B. Warren has been named manager of industrial products departments, Goodyear Tire & Rubber Co. at Akron by H. D. Foster, manager of the company's industrial - products division.

L. W. Adams has been promoted to Warren's former post as southern sales manager, industrial products division.

Warren joined Goodyear in 1927 following his graduation from Ohio Wesleyan University. In 1933 he became an industrial products field representative in Atlanta, transferring to New York in 1938. Warren was industrial products district manager at Pittsburgh from 1947 to 1949 before becoming southern sales manager.

Adams, who has been Pittsburgh district manager for Goodyear's industrial products division since 1949, joined Goodyear in 1943 as an industrial products clerk. Later that year he was assigned to the Boston district as a field representative.

Western Co. Names Frack to New Engineering Position

Morris W. Frack has been promoted to position of consulting mechanical engineer for The Western Co., Midland, Tex., it has been announced by John F. Younger, Western's vice president and assistant general manager. Frack will serve in an advisory capacity to Western's management personnel on major mechanical-engineering problems relating to oil-well servicing. He also will conduct research on special mechanical problems in regard to oil-well servicing equipment.

Frack is a graduate of University of Oklahoma and holds a bachelor of mechanical engineering degree. He has had many years' experience in the oil-well servicing field.

B. J. Terrell, former experimental and development engineer for The Western Co. will succeed Frack as chief mechanical engineer.

Watts-Payne Reelects Officers at Annual Meet

At the annual stockholders and directors meetings held recently in Tulsa by Watts, Payne—Advertising, Inc., the present officers and directors were reelected for the current year, including Don Watts, president; Burke Gilliam and Les Hauger, vice presidents, and Oscar Payne, secretary-treasurer.

Watts-Payne is one of the leading advertising firms in oil and oil-equipment advertising, and numbers among its clients many of the largest and oldest firms in the industry. The agency is a member of the American Association of Advertising Agencies.

The agency was founded in 1930 by Don Watts, and the following year Oscar Payne joined the firm, making the organization also one of the oldest advertising agencies under the same management in the Southwest.

WILDCAT COMPLETIONS

(Continued from page 307)

Weld County: Reco Oil and Stout Oil Co. 1 Luce, NE NE SW 2-8n-57w. Dry. TD 6,020 ft.

Logan County: Westlund Drilling Co. 1 Tetsell, SE SE SW 11-8n-53w. Dry. TD 5,062 ft.

Logan County: Plains Exploration Co. 1 Bock, SE SE NW 9-7n-50w. Dry. TD 4,842 ft.

* Mesa County: Frontier Refining Co. 1 Unit, C NW NW 31-8s-104w. IP 15,200 M.c.f. of gas per day, 2-in., 8,500 M.c.f. ¾-in., TD 3,550 ft. PBTD 2,890 ft. (Dakota gas discovery, new field.)

MANITOBA

Souris Valley-Pascar 10-13 Downey, LSD 13, 10-12-7w1. Dry. TD 3,397 ft.

Skelton 4-11, LSD 14, 4-3-27w1. Dry. TD 3,392 ft.

SASKATCHEWAN

Amurex-Albercan 1-15 McCloud, LSD 15, 12-10-27w3. Dry. TD 4,125 ft.

Socony-Woodley 22-1 South Cabri, LSD 1, 22-18-18w3. Dry. TD 3,821 ft.

* Canada Southern 6-14 Dewar, LSD 6, 14-31-26w3. Gas well. PB 2,433 ft. TD 2,900 ft.

Tide Water-Placid-Hawarden 1 Crown, LSD 12, 10-29-5w3. Dry. TD 5,666 ft.

Tide Water-Pelletier 1 Crown, LSD 1, 27-12-15w3. Dry. TD 4,300 ft.

Tide Water-Matador 1 Crown, LSD 4, 25-20-16w3. Dry. TD 3,320 ft.

Shell 3 Wood Mountain, LSD 7, 18-7-8w3. Dry. TD 4,783 ft.

Shell Oil Co. 5 Wood Mountain, LSD 10, 11-3-9w3. Dry. TD 5,500 ft.

ALBERTA

Canadian Atlantic-Amerada 7-29 Camrose, LSD 7, 29-47-17w4. Dry. TD 4,650 ft.

* Imperial 7-10B Excelsior, LSD 7, 10-56-24w4. Gas well. TD 3,555 ft.

New Concord - Marwayne 12-22 Hoadley, LSD 12, 22-44-3w5. Dry. TD 8,720 ft.

Allenbee-Peak & Associates Petro 1 Owen Lake, LSD 9, 23-50-20w4. Dry. TD 3,595 ft.

* California Standard 5-16 Sylvan Lake, LSD 5, 16-38-2w5. Gas well. PB 6,555 ft. TD 9,498 ft.

* Stanolind-Cal Standard 2 Pigeon Lake, LSD 15, 24-46-28w4. D3 Devonian oil well. TD 7,161 ft.

Baysel-H. B. 9-12 Linden, LSD 9, 12-30-26w4. Dry. TD 8,209 ft.

BRITISH COLUMBIA

Pacific 1 Gates, LSD 5, 15-82-25w6. Dry. TD 3,576 ft.

ADVERTISERS

Acme Oil Tool Company 297
Aero Design and Engineering Company 189
Aeroquip Corporation 65
Allison Division of General Motors 64
Alten Foundry & Machine Works 234
Aluminum Co. of America 264
American Brass Co., The 31
American Car and Foundry Company 56
American Manufacturing Co. of Texas 17
Ampco Metal, Inc. 232
Ansul Chemical Co. 224
Appleton Electric Company 186
Ardun Supply Company 264
Armstrong Bros. Tool Co. 273
Armstrong Machine Works 228
Axelson Manufacturing Company 178
Babcock & Wilcox Company, Tubular Products Division, The 67
Baker Oil Tools, Inc. 122
Bank of Toronto, The 292
Barksdale Valves 227
Baroid Sales Division, National Lead Company 187, 188, 189, 190
Barrett Division of Allied Chemical & Dye Corp. 110
Bethlehem Steel Co. 161
Black, Sivalls & Bryson, Inc. 15
Bonney Forge & Tool Works 83
Bovaird Supply Co., The 43
Bowen Fishing Tool Company 300
Bristol Company, The 30
Broderick & Bascom Rope Co. Back Cover
Brown Fintube Co., The 84
Bucyrus-Erie Co. 69
Burden Construction Corporation, O. R. 258
Burgess-Manning Company 79
Butler Manufacturing Co. 58
Byron Jackson Co. 62, 63
Cabot Shops, Inc. 13
Canadian Bank of Commerce 173
Cardinal Chemical, Inc. 111
Carrier Corporation 177
Caterpillar Tractor Co. 8
Chain Belt Co. 85
Chemical Construction Corporation 66
Chicago Pneumatic Tool Company 99
Citizens Utilities Company 266
City National Bank of Houston, The 119
Classified Advertising 312, 313, 314, 315, 316
Cleaner Pipelines Co. 273
Cleveland Diesel Engine Division General Motors 98
Colorado Fuel and Iron Corp., Wickwire Spencer Steel Division 235
Continental Motors Corp. 91
Continental Supply Co., The 105, 106
Cooper-Bessemer Corp., The 162, 163
Coppus Engineering Corp. 3
Core Laboratories, Inc. 215
C-O-Two Fire Equipment Company 73
Crane Co. 2
Crescent Plastics, Inc. 291
Cutler-Hammer, Inc. 9
Daniel Orifice Fittings Company 182
Darling Valve and Mfg. Co. 251
Dayton Rubber Co. 102
Dean Brothers Pumps, Inc. 264
Dean Hill Pump Company 53
De Laval Steam Turbine Co. 40
Delta C & S Air Lines 107
Desco Service Co. 277
Deublin Company 118
Diamond Chain Company, Inc. 61
Dowell Incorporated 180, 181
Drilling & Service, Inc. 298
Duff-Norton Mfg. Co. 57
du Pont 104
Eastman Chemical Products, Inc. 7
Electric Steel Foundry Co. 237
Elliott Company 74
Empire Trust Company 300
Fairbanks, Morse & Co. 293
Farrel-Birmingham Co., Inc. 39
Federated Metals Division American Smelting and Refining Company 254
First National Bank & Trust Co. of Tulsa, The 274
First National Bank in Dallas 70
Fisher Governor Company 60
Flexonics Corporation 100, 101
Fluid Packed Pump Company 217, 218
Fluor Corporation, Ltd., The 213
Fort Worth Steel & Machinery Co. 257
Foster Company, L. B. 274
Foster Engineering Company 197
Fuller Company 305
Galion Iron Works & Mfg. Co., The 20
Gaso Pump & Burner Mfg. Co. 24
Gates Rubber Co., The 282
General Services Administration 306
Geological Well Service Company 297
Geophysical Service, Inc. 299
Goodrich Chemical Company, B. F. (Hycar) 165
Gott Mfg. Co., H. P. 228
Grancell, I. H. 289
Grip-Tite Manufacturing Co. 241
Griscom-Russell Co., The 77
Guiberson Corporation 112
Haering & Co., Inc., D. W. 253
Halliburton Oil Well Cementing Co. Inside Front Cover, 12
Harnischfeger Corp. 92
Harrisburg Steel Corporation 303
Hazard Wire Rope Division of American Chain & Cable Co., Inc. Inside Back Cover
Honeycutt, Broaddus 277
Hough Co., The Frank G. 49
Hudson Engineering Corporation 208
Hughes Tool Co. Front Cover
Hyatt Bearings Division, General Motors Corp. 42
Hydril Company 268
Inferno Co., The 278, 280
Ingersoll-Rand 256
International Industries, Inc. 258
Johns-Manville Corporation 93
Johnston & Jennings Company, The, Division of Pettibone Mulliken Corporation 293
Jones & Laughlin Steel Corporation Supply Division 25
Jones Company, The S. M. 58
Justrite Manufacturing Co. 296
Kelly Company, Ben F. 296
Kemp Mfg. Co., C. M. 5
Kennametal, Inc. 87
Kenyon & Sons, Ltd., William 206
Kinzbach Tool Co., Inc. 241
Koch Engineering Company, Inc., The 210
Koppers Company, Inc. 76
Kysor Heater Company 90
Ladish Co. 207
Landis Machine Co., The 6
Lane-Wells Company 120
Larkin Packer Company, Inc. 222
Le Roi Company 18, 19
Leschen & Sons Rope Co., A. 229
Lone Star Cement Corporation 124
Lucey Boiler and Manufacturing Corporation 236
Lufkin Foundry & Machine Co. 47
Lunkenheimer Co., The 68
Mack Trucks, Inc. 28
Marley Company, Inc., The 11
Marquette Metal Products Co., The 16
Martin-Decker Corp. 45
Mason-Neilan Regulator Co. 88, 89
Maxim Silencer Company 233
McCord Corporation 276
McKissick Products Corporation 219
Midwest Piping Co., Inc. 23
Minneapolis-Moline 196
Mixing Equipment Co., Inc. 170
Moore Corporation, Lee C. 194, 195
Morse-Starrett Products Company 183
Mundet Cork Corporation 113
Murphy Diesel Company 22
Murphy, Frank W. 185
Muskogee Iron Works, Inc. 262
National Airoil Burner Co., The 176
National Bank of Tulsa 103
National Supply Co., The 35, 36, 37, 38, 48
National Tank Company 318
Nicolet Industries, Inc. 272
Nordberg Mfg. Co. 280
North American Geophysical Company 14
Oakite Products, Inc. 241
Ohio Injector Company 29
Oil Center Tool Co. 109
Oil Well Supply Co. 4
Oklahoma Pipe Line Constructors 272
Oliver Iron and Steel Corporation 290
Orbit Valve Company 252
Parelex Corporation 278
Parkersburg Rig & Reel Co. 174
Peerless Supply Co., Inc. 274
Penberthy Injector Co. 10
Penn Controls, Inc. 199
Petro-Chem Development Co., Inc. 260
Petroleum Rectifying Company 44
Petty Geophysical Company 115
Philco Corporation 55
Phoenix Manufacturing Company 228
Pipelife, Inc. 41
Posey Iron Works, Inc. 75
Powers Regulator Company, The 95
Price Company, H. C. 166, 167
Procon Incorporated 50, 51
Pur-O-San Company 258
Pyle-National Company, The 242
Pyrene Manufacturing Company 242
Reed Roller Bit Company 200
Refinery Supply Co., The 204
Republic Steel Corporation 80, 81
Republic Supply Company 198
Ridge Tool Company, The 234
Robbins & Myers, Inc. 295
Roebling's Sons Company, John A. 192
Royal Bank of Canada, The 302
S&R Tool & Supply Co. 232
Sarco Company, Inc. 94
Schlumberger Well Surveying Corp. 301
Second National Bank of Houston 281
Security Engineering Co., Inc. 221
Shamrock Hotel, The 276
Sivalls Tanks, Inc. 226
SKF Industries, Inc. 96, 97
Smith Oil Tool Co., H. C. 279
Southern Engine and Pump Company 82
Southern Mill & Mfg. Co. 78
Spang & Co. 304
Spang-Chalfant Division of The National Supply Co. 38, 48
Sperry-Sun Well Surveying Co. 185
Spicer Mfg., Div. of Dana Corp. 32
Standco Brake Lining Co. 280
Steel Forgings, Inc. 274
Technical Oil Tool Corp., Ltd. 287
Thompson Tank & Manufacturing Co., Inc. 232
Thornhill-Craver Co. 52
Tobin Aerial Surveys, Edgar 205
Tretolite Company 21
Tube Turns, Inc. 71, 72
United Engineers, Inc. 290
U. S. Steel Corp. Subsidiaries 4
United States Rubber Company 33
United Supply & Manufacturing Co. 116
Universal Atlas Cement Co. 284
Universal Oil Products Co. 248, 249
Victor Products Corp. 277
Vogt Machine Co., Henry 46
Voss Co., Inc., J. H. H. 275
Wallace & Tiernan Products, Inc. 114, 185
Wall Colmonoy Corporation 117
Warner Lewis Company 275
Watson-Stillman Fittings Division H. K. Porter Company, Inc. 203
Weil Equipment Mfg. Corp. 175
Western Supply Company 255
Westinghouse Electric Corp. 26, 27, 238, 239
Wichita Falls Foundry & Machine Co., Inc. 193
Wickes Boiler Co., The 191
Wickwire Spencer Steel Division, Colorado Fuel and Iron Corp. 235
Williams Brothers 272
Williamson, Inc., T. D. 245
Willson Products, Inc. 251
Wilson Manufacturing Co., Inc. 54
Winpower Mfg. Co. 277
W-K-M Company 86
Wood's Sons Co., T. B. 274
Worthington Corporation 108
Wright Chemical Corporation 209
Yarnall-Waring Company 94
Youngstown Sheet and Tube Company 159

Maloney-Crawford Transfers O. W. Maloney, Jr., to Tulsa

O. W. Maloney, Jr., sales engineer with Maloney-Crawford Tank & Manufacturing Co., has been transferred from Ardmore, Okla., to Tulsa, according to S. P. Wallace, president.

Maloney has been with the company since 1946 and has served in various Maloney-Crawford offices and districts, including New Orleans, West Texas, Dallas, Oklahoma City, and Ardmore.

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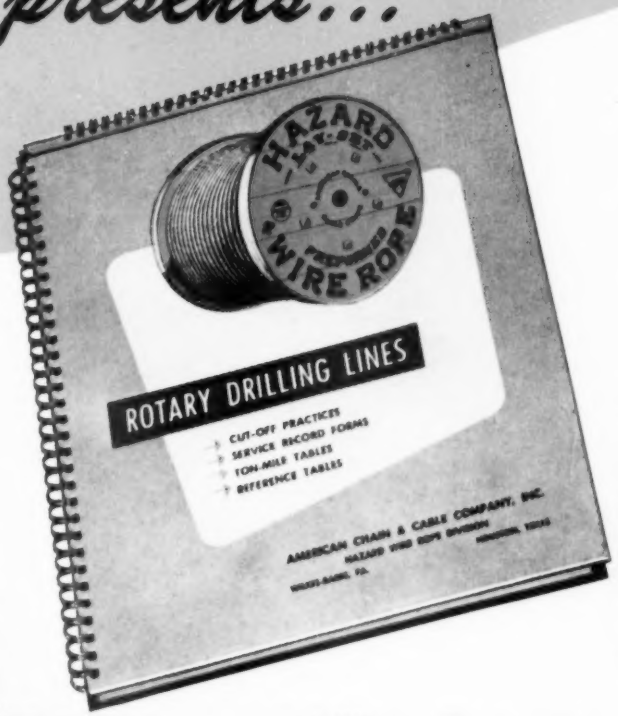

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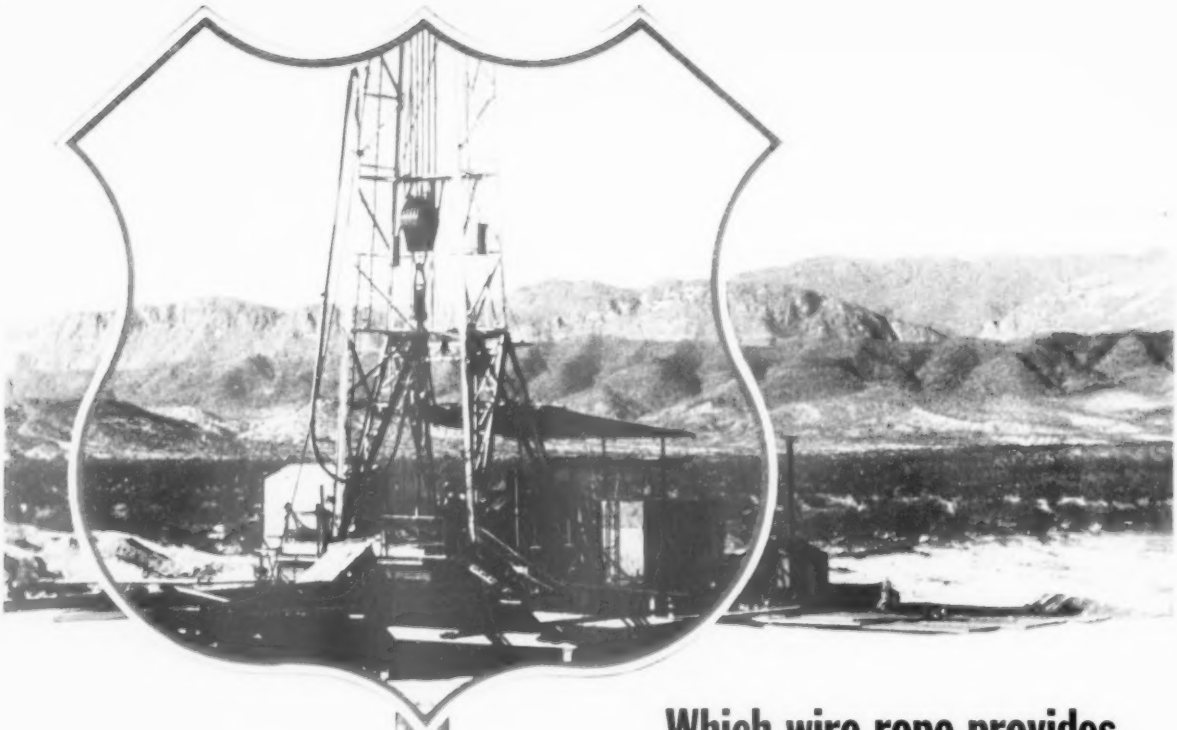

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